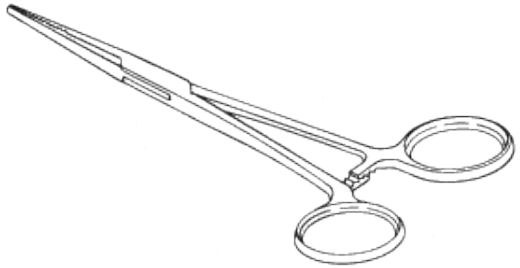
SERVICE GUIDE

FOR
A-DEC DELIVERY SYSTEMS

Table of Contents

General Service Information 3
Manual Shut-Off Valve 6
Pre-Regulators 7
Filters 9
Pilot-Operated Regulators 10
Foot Control II 13
Foot Control Valve 15
Signal Relay Valve 17
Three-Way Control Valves 19
Two-Way Control Valve 21
Three-Way Micro-Valve 22
Two-Way Micro-Valves 24
Needle Valves 26
Micro-Selector Valve 27
Rotary Selector Valve 28
Routing and Selector Valves 30
Water Relays 31
Water Shut-Off Valves 33
Syringes 35
Recirculator 38
Century II Master Block Assembly 40
Century II Control Blocks 45
Handpiece Holdback System (Excellence Model 4300) 53
Century II IC Handpiece Control Assembly 56
Century Plus Control Blocks 60
Century Plus Handpiece Control Assembly 63
Century Pac 74
Century Water Valve 78
Automatic Control Systems 81
Air Coolant Valve 85
Water Coolant Valve 87
Automatic Bowl Rinse System 90
Automatic Cup Fill System (Century II and Decade) 93
Automatic Cup Fill System (Excellence) 95
Vacuum Drain Actuator Assembly 97
Clean Water System 101
Handpiece Flush System 102

SPECIAL TOOLS AND EQUIPMENT



HEMOSTATS

Hemostats are useful for temporarily stopping air or water flow through the tubing while troubleshooting or repairing the unit. A-dec P/N 009.008.00.

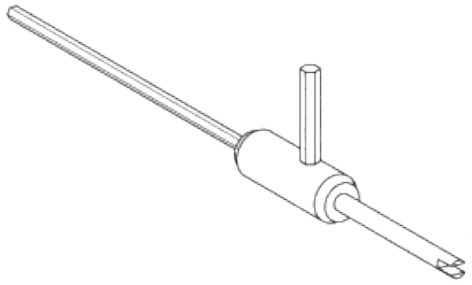
VALVE TEST SYRINGE

The Valve Test Syringe is used for making quick tests of pilot-operated valves. It can apply a static pressure of 5 to 75 psi. A-dec P/N 98.0050.00

050108

TEST GAUGE

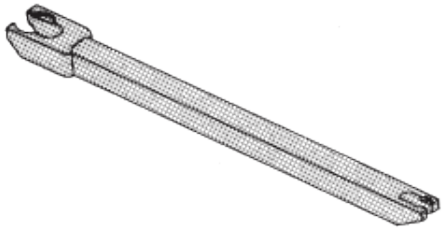
The Test Gauge (A-dec P/N 026-014-00) is used to check air pressure at various points while troubleshooting the system. Also required for use of this gauge: one barb fitting (P/N 023.028.00),, a washer (P/N 004.005.00), a tee barb fitting (P/N 023.014.00), two tubing sleeve clamps, and a two-foot length of 1/8-inch tubing, (P/N 024.015.00).



SYRINGE TOOL

(For Uni-Flo and Tri-Flo Syringes)

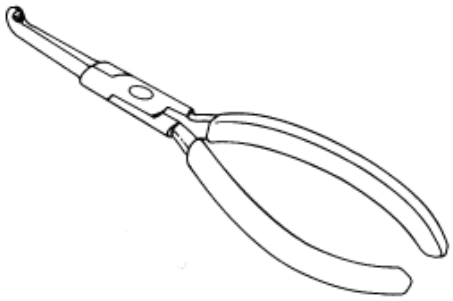
The A-dec Syringe Tool incorporates a cartridge valve tool, a 3/32-inch hex wrench for adjusting the syringe flow, and a 5/32-inch hex wrench for removing and installing the syringe tip insert. A-dec P/N 98.0010.00.



SLEEVE TOOL

The A-dec Sleeve Tool is used for pressing the 1/4 and 1/8-inch tubing sleeves in place when installing the tubing on barb fittings. A-dec P/N 98.0072.00.

General Service Information

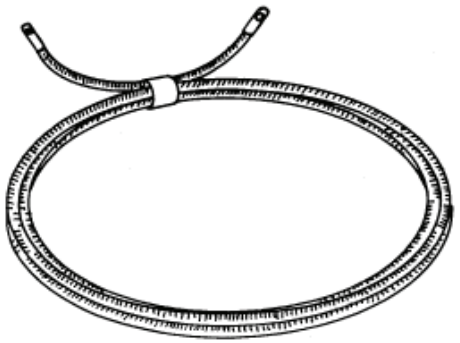


TUBING PLIERS

These modified pliers are used for pushing 1/8-inch tubing onto the barbed fittings. A-dec part no. 009.014.00.

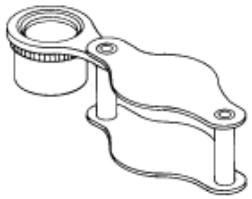
SNAP RING PLIERS

These snap ring pliers are for both inside and outside snap rings, and fit all the sizes used in A-dec equipment. A-dec part no. 009.007.00.



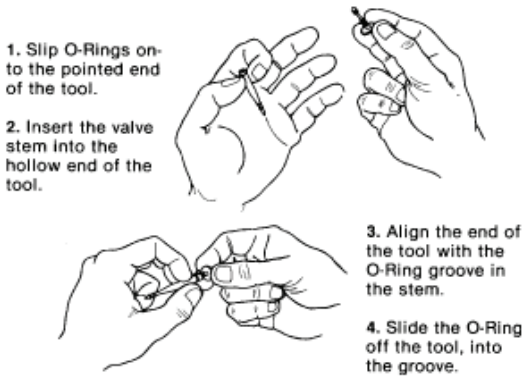
UMBILICAL TUBING STRINGER

This tool provides an easy way to string new or additional tubing into an existing umbilical assembly. A-dec part no. 009.015.00.



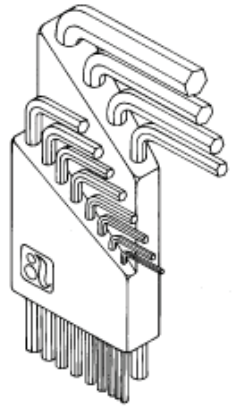
POCKET MAGNIFIER

This is a 10X magnifier for inspecting for defects in miniature valve parts. A-dec part no. 009.009.00.


1. Slip O-Rings onto the pointed end of the tool.
2. Insert the valve stem into the hollow end of the tool.
3. Align the end of the tool with the O-Ring groove in the stem.
4. Slide the O-Ring off the tool, into the groove.

O-RING INSTALLATION TOOLS

These tools enable you to make quick repairs, in the field, on most A-dec miniature components. The three tools in this set fit the four smallest O-ring sizes in A-dec equipment. A-dec part no. 009.013.00.



HEX WRENCH SET WITH HOLDER

This complete hex wrench set includes all hex wrenches that might be required in servicing A-dec equipment. The plastic holder keeps the hex wrenches together and makes them easy to identify. A-dec part no. 009.018.00.

PARTS INSPECTION

In the Troubleshooting Guide section of this manual you will find references to the "seal area" as the location of possible defects. The seal area is comprised of the seal itself (usually an O-ring), the bore or seat in the valve body, and the O-ring groove in the valve stem or piston. Defects in any of these may result in seal leakage, so an inspection of the seal area includes a careful examination of all sealing parts and surfaces. A magnifier, as shown in the SPECIAL TOOLS AND EQUIPMENT section, is essential for detecting flaws that are too small to see otherwise.

When servicing components that have rubber gaskets or diaphragms, it is generally advisable to install new ones when reassembling the components. If the old gasket or diaphragm is to be re-used, carefully check for pin holes or cracks.

LUBRICATION

A-dec Silicone Lubricant, part no. 98-0090-00 is a high quality silicone base grease that is ideal for lubricating the internal moving parts, O-rings, oral evacuator valves, and bushings in the moveable arm systems. An acceptable substitute for the A-dec Lubricant is Dow-Corning No. 103 Silicone Lubricant.

Before installing O-rings, always apply a light coating of silicone grease. This makes installation easier, and will prevent the O-rings from being damaged. The seal bores should also be lightly lubricated before inserting the stems or pistons.

CLEANING INTERNAL PARTS

When servicing dental systems, the parts of any component disassembled should be thoroughly cleaned and inspected for defects before re-assembly. The lubricant recommended for these parts is largely impervious to chemical solvents, so the most effective cleaner is a hot detergent solution. Any wiping should be done with a soft, lint-free cloth. Flush all parts with clear, hot water, then rinse them in isopropyl alcohol.

A-DEC TUBING

The 1/8-inch tubing used throughout A-dec dental units is specially engineered for durability and long life. Use only A-dec tubing for replacement.

When troubleshooting the system, bear in mind that although this tubing is resistant to crimping, it nevertheless can become crimped and obstruct the flow. Crimps are often caused by the tubing being too short, so that it is stretched at the barb connections, at bends in the umbilical, or at the pivot points in arm systems. Remember when installing any tubing that slack tubing rarely becomes crimped, and allow adequate length.

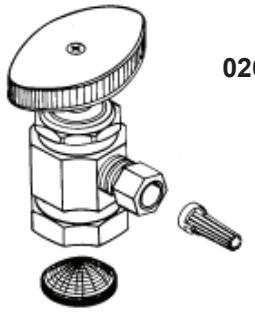
A-DEC FACTORY SERVICE

Most A-dec valves and components can be serviced in the field or in dealer repair shops with the aid of the special tools described in this manual. However, while this may be necessary in some cases to get a doctor's equipment back into operation quickly, it may prove to be too time-consuming to do in all cases. A-dec factory service provides fast, complete repair by experienced technicians with full manufacturing facilities.

NOTES

Manual Shut-Off Valve

The Manual Shut-Off Valve shown here is used for both air and water in A-dec systems. It is a standard valve, available through local plumbing supply houses. The inlet is threaded 1/2 in. NPT female, and the outlet is for a 3/8 in. compression fitting. On Manual Shut-Off Valves, prior to February, 1982, a strainer screen is located at the inlet side of the valve. Since February, 1982, the screen is located at the outlet side of the valve. Except as noted in the troubleshooting procedure below, this is a non-serviceable component.



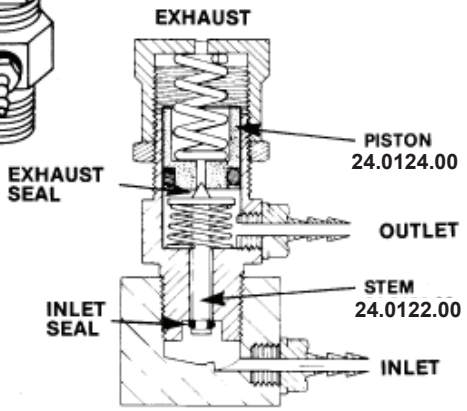
026.062.00

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Restricted Flow.	Clogged Screen.	Turn OFF the Master On-Off Valve, and bleed off the pressure from the unit. Turn OFF the Manual Shut-Off Valve, and open the line on the outlet side of the valve, ahead of the Filter-Regulator. Cover the opening with a towel and turn ON the Manual Shut-Off Valve. The flow from the valve should be strong and unrestricted.	If the flow is not restricted, check for problems in the Filter or Regulator.	If the flow is restricted, replace or clean the screen and repeat the test.
Leak at stem.	Valve not turned all the way ON.	Turn the handle fully counter-clockwise, and watch for continued leakage.	If leaking stops, no further action is required.	If leaking continues, check the packing nut.
	Loose packing nut.	Tighten the packing nut, and watch for continued leakage.	If leaking stops, no further action is required.	If leaking continues, replace the valve and re-test.
Valve is hard to turn.	Packing nut is too tight.	Loosen the packing nut slightly, and turn the valve on and off. The valve should loosen up after several turns.	If the valve turns easily, no further action is required.	If it still turns hard, proceed with the next step.
	Packing requires lubrication.	Apply a silicone spray lubricant (Dow-Corning 4X, or equivalent) to the shaft and work the valve to distribute the lubricant on the packing.	If the valve turns easily, no further action is required.	If it still is hard to turn, install a new valve.
Leak at outlet connection.	Loose connection.	Tighten the connection, and watch for continued leakage. Be careful not to over-tighten and thereby damage the nut.	If leaking stops, no further action is required.	If leaking continues, replace the valve and re-test.
	Damaged nut or compression sleeve.	Remove and visually inspect the nut and compression sleeve.	If no defects are found, re-install the nut and sleeve and test for leakage.	If the nut or sleeve is defective, replace it and re-test the valve.

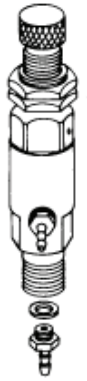
Pre-Regulators

24.0118.00
EARLY DESIGN
(1973-1978)



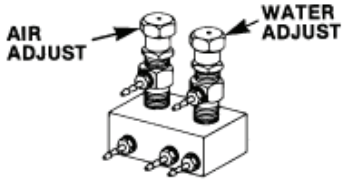
The 24-0118-00 Pre-regulator is a miniature, self-relieving, adjustable regulator used in A-dec systems to control the pilot air pressure for the air and water regulators. It is this pilot pressure that controls the system pressure as indicated on the gauge, at the outlet of the main (pilot-operated) regulator.

This Pre-regulator was replaced in 1979 units by the panel mounting Pre-regulator 24-0182-00, which is functionally identical to 24-0118-00. A new design of the 24-0118-00 Pre-regulator has been engineered for direct replacement of the old design. Internally, it is the same as the current design of the 24-0182-00 Pre-regulator. Both of the current design pre-regulators, 24-0118-00 and 24-0182-00, are non-repairable components. If the troubleshooting procedures given here indicate an internal defect, install a new pre-regulator.



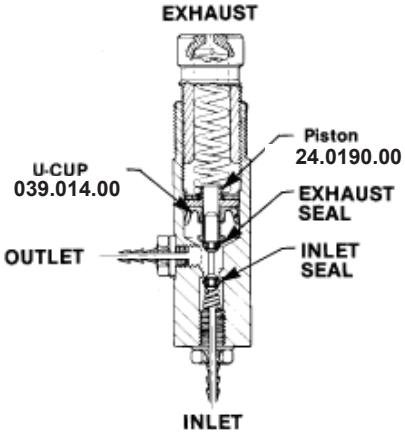
24.0118.00
CURRENT DESIGN

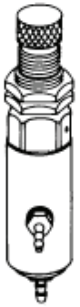
UNIVERSAL REPLACEMENT FOR ALL PRE-REGULATORS SHOWN ON THIS PAGE



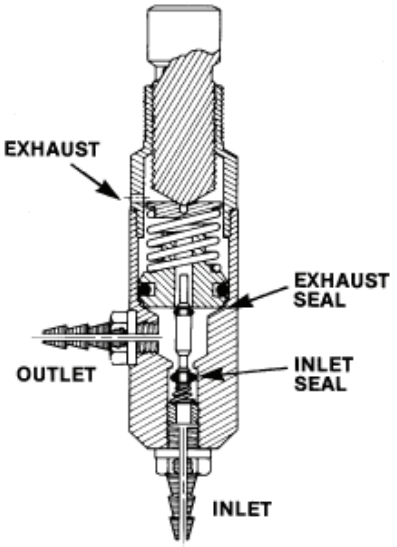
The optimum system pressures for all A-dec units are 80 psi for Air, and 40 psi for Water. In systems that use the dual Pre-regulators (see page nos. A-1, A-4, and A-7), the air pressure must be adjusted before the water pressure, since that adjustment will affect both the air and water pressures.

24.0182.00
EARLY DESIGN
(1978-1980)





24.0182.00
CURRENT DESIGN



In systems that use a single Pre-regulator (see pages A-2, A-5 and A-6), the air and water pressures are both controlled by the same regulator whose outlet pressure is always one-half that of the air regulator. Thus, by adjusting the system air pressure to 80 psi, the water pressure will automatically be regulated to 40 psi. In systems that use two of these Pre-regulators, the air and water pressures are independently adjustable.

The Pre-regulator is adjusted by turning the knob, clockwise to increase pressure or counter-clockwise to decrease pressure. When adjusting to decrease the pressure, it is necessary to relieve the pressure in the system before reading the guage, since the pilot-operated regulators are not self-relieving. This is done by running a handpiece or depressing the syringe buttons.

Pre-Regulators

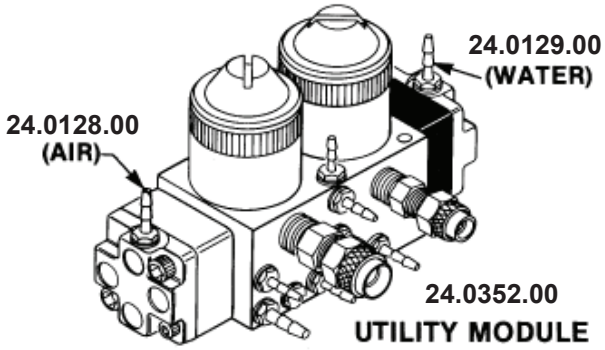
TROUBLESHOOTING GUIDE				
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Regulated pressure is too high, and cannot be lowered by adjusting the Pre-regulator.	Failure to bleed the system while adjusting the Pre-regulator.	When adjusting the Pre-regulator for a lower pressure (counter-clockwise), it is necessary to relieve the pressure on the outlet side of the Regulator before the pressure change will show on the gauge. Use the syringe, or run a handpiece with the coolant turned ON, to relieve the pressure.	If the gauge now shows a lower pressure, continue using this procedure to adjust for the correct pressure.	If the pressure does not drop, proceed with the next step.
Regulated pressure increases after adjustment.	Leaking inlet Seal in the Pilot-Operated Regulator.	Turn the Master On-Off Valve OFF, then bleed the system. The system pressure should drop to zero and stay.	If system pressure drops to zero and stays, the problem is in the Pre-regulator. Proceed with the next step.	If there is any leakage, inspect the inlet seal area. If any parts are defective, replace the Pre-regulator with one of the new design. Re-test the unit.
	Inlet seal is leaking.	Early Design Pre-Regulators: Turn OFF the air supply at the Manual Shut-Off Valve, then remove the adjusting screw, spring, and piston. Open the Manual Shut-Off Valve a quarter-turn and check for air coming from the Pre-regulator. Current Design Pre-Regulators: Install a new Pre-regulator, then re-test the unit.	If there is no leakage, carefully clean and lubricate all parts. Assemble the Pre-regulator and re-test.	If there is any leakage, inspect the inlet seal area. If any parts are defective, replace the Pre-regulator with one of the new design. Re-test the unit.
Air leaking from vent hole.	Leakage past the piston seal or exhaust seat.	Early Design Pre-Regulators: Remove the adjusting screw, spring, and piston from the Pre-regulator. Inspect the exhaust seat, stem, piston o-ring, and bore for defects or foreign matter. Current Design Pre-Regulators: Install a new Pre-regulator, then re-test the unit.	If there are no defects, proceed with the next step.	If any parts are defective, replace the Pre-regulator with one of the new design. Re-test the unit.
	Inlet seal does not fully close.	Early Design Pre-Regulators: With the adjusting screw, spring, and piston removed, and air pressure applied at the inlet, there should be no air leakage from the Pre-regulator. Current Design Pre-Regulators: Install a new Pre-regulator, then re-test the unit.	If there is no leakage, re-assemble the Pre-regulator making sure all parts are cleaned and lubricated. Re-test the unit.	If there is any leakage, clean and inspect the inlet seal area. If any parts are defective, replace the Pre-regulator with one of the new design. Re-test the unit.
No pressure from the outlet.	Pre-regulator is improperly adjusted.	Try adjusting the Pre-regulator by turning the knob clockwise.	If this results in pressure at the outlet, adjust the pressure, as instructed above.	If adjustment does not help, check for air pressure at the supply.

Filters

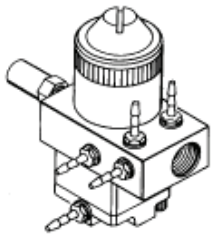
The air and water suplies must pass through filters before entering the regulators. The filter most commonly used in A-dec dental systems is an integral part of the Filter-Regulator Assembly (24-0170-00, 24-0168-00, or 24-0175-00) or Utility Module Assembly (24-0352-00). It uses a replaceable filter element in a housing that mounts on the regulator or module manifold.

Another filter (026-066-00) sometimes used in A-dec systems uses a replaceable filter element housed in a transparent plastic bowl. This filter is used only for air, and also serves as a moisture separator. When liquid accumulates in the bowl, it should be released by pressing the purge valve.

The troubleshooting procedures given here apply equally to the filters described above, as well as to a porous disc filter element used in the Air and Water Filter Regulator Pac (24-0114-00) and Water Filter (19-0200-00).

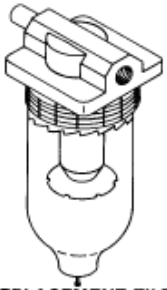


24.0170.00



REPLACEMENT FILTER ELEMENT: 24.0234.00

026.066.00

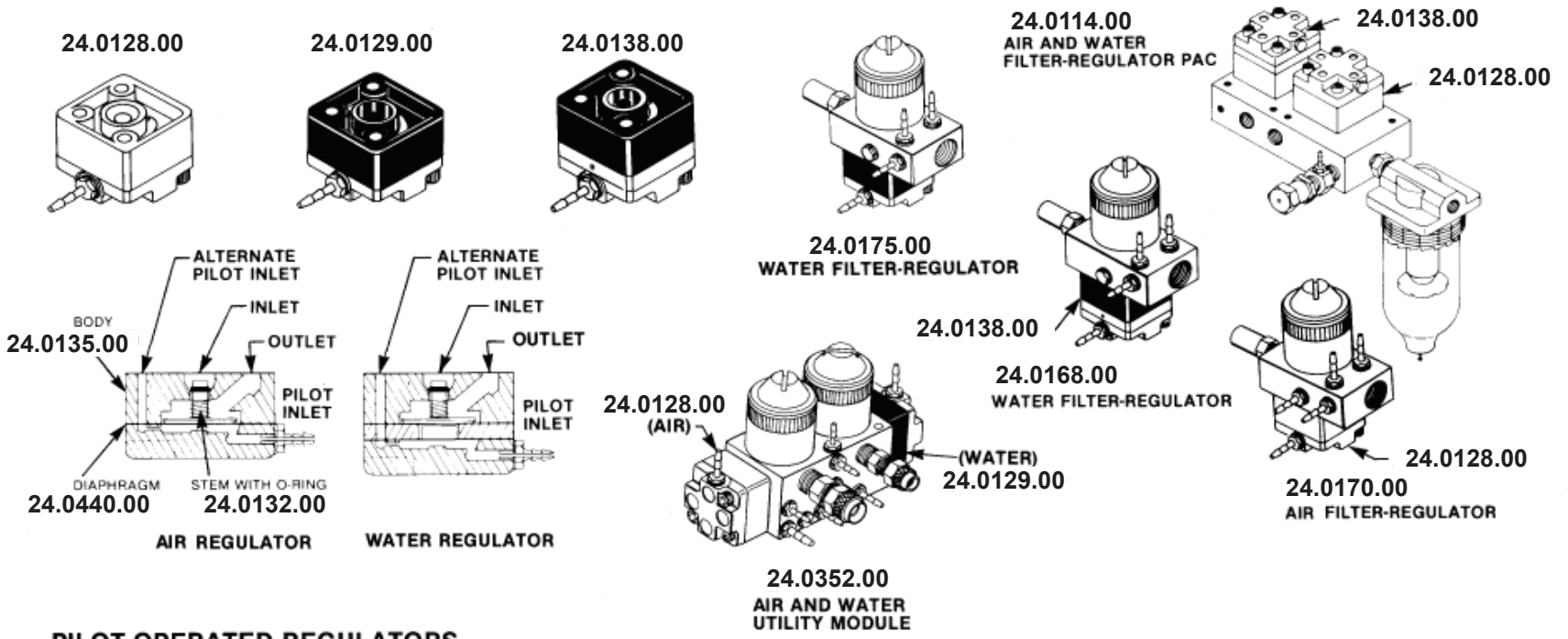


REPLACEMENT FILTER ELEMENT: 97.0280.00

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Insufficient flow to the system.	Restriction in the system downstream from the filter.	Turn the system ON and verify that the system pressure is correctly adjusted. While watching the gauge, depress the foot control and syringe button. The gauge should not drop by any more than 15 psi for air or 10 psi for water.	If the pressure drop is less than specified, the restriction is downstream from the filter.	If the pressure drop is greater than specified proceed with the next step.
	Clogged filter element.	Turn the Manual Shut-Off Valves OFF and bleed the system. Disassemble the filter and remove the element, then assemble it without the element. Repeat the test given above.	If the pressure drop is less than specified, install a new filter element and re-test.	If the pressure drop is greater than specified, check for a clogged screen in the Manual Shut-off Valve. Refer to the instuctions for the Manual Shut-Off Valves.
Leaking.	Bad O-ring seal.	Try tightening the filter housing. If it still leaks, turn the Manual Shut-Off Valve OFF, remove the housing and inspect the O-ring.	If the O-ring is in good condition, clean and lubricate it. Assemble and re-test the unit.	If the O-ring is defective, install a new one, assemble and re-test the unit.

Pilot-Operated Regulators



PILOT-OPERATED REGULATORS

The regulators covered here are manifold-mounting, non-relieving, pilot-operated pressure regulators. There are, as shown, three different pilot-operated regulators used in A-dec dental systems. The 24-0128-00 works on a one-to-one ratio, so that outlet pressure equals pilot pressure, and is currently used primarily for regulating air. The 24-0129-00 also works on a one-to-one ratio, but uses a heavier-duty spring for regulating water only. The 24-0138-00 works on a two-to-one ratio, so that the outlet pressure is one-half pilot pressure, and is used for regulating water only.

The 24-0128-00 pilot-operated regulator has been used for both air and water applications in A-dec systems since 1974. Originally, the body and stem were brass, but the stem was later changed to plastic. The brass and plastic stem are completely interchangeable. In 1980, the body was changed from brass to white plastic as a product improvement. The plastic-bodied regulator is interchangeable with the brass-bodied regulator when used with the 24-0137-00 gasket (supplied with all plastic regulators). When the plastic regulator is used on the 24-0114-00 Filter-Regulator Pac, an adapter plate must be used. This adapter is supplied with each pilot-operated regulator when purchased as a separate component. As of late 1981, the 24-0128-00 is no longer used in water regulating applications. It is used for air only.

The 24-0129-00 pilot-operated regulator has been used in A-dec systems since late 1981 to regulate water only. The 24-0129-00 is functionally identical to the 24-0128-00, except the 24-0129-00 uses a heavier-duty spring. The plastic body is black to differentiate it from the 24-0128-00. The heavier-duty spring is used to prevent loud, horn-like noises sometimes produced by stem oscillation during periods of low flow across the valve seat. This regulator may be used to replace the 24-0128-00 regulator for water regulating applications only on older units.

The 24-0138-00 pilot-operated regulator has been used in A-dec systems since 1974 to regulate water only, in systems having only one pre-regulator. The body and stem were originally brass, but evolved in the same manner as the 24-0128-00. In late 1981, the spring and the white plastic body were replaced by the heavier-duty spring and the black plastic body used in the 24-0129-00 regulator.

A-dec systems that use two pre-regulators (see page nos. A-1, A-4, A-7) use the 24-0128-00 regulator for air and the 24-0129-00 for water. Systems that use a single pre-regulator (see page nos. A-2, A-5 and A-6) use the 24-0128-00 for air and the 24-0138-00 for water.

Pilot-Operated Regulators

TROUBLESHOOTING GUIDE				
SYMPTOM	**POSSIBLE CAUSE**	**TEST PROCEDURE**	**CORRECTIVE ACTION**	
			IF TEST IS NORMAL	**IF TEST IS ABNORMAL**
System pressure drops when the system is in use, then builds back up when it is not being used.	Inadequate supply flow to the Regulator inlet.	Check for a clogged screen in the Manual Shut-Off Valve or a clogged Filter element, as explained on the pages covering those components.	If there is an adequate flow at the Regulator inlet, proceed with the next step.	Clean or replace the clogged part, and re-test the unit.
	Air Regulator Only: Hole in the Regulator diaphragm.	Disconnect the "Pilot Air" tube from the Regulator, and use a Valve Test Syringe to pressurize the Pilot Air Inlet on the Regulator. You should be able to inject only a limited amount of air into the Regulator, and the plunger should spring back out by itself when released. If a Valve Test Syringe is not available an alternate method of checking this is to turn the system ON and let it come up to full pressure. Turn the system OFF, while watching the system pressure gauge. If the pressure drops rapidly to zero, the diaphragm is probably bad.	If no defect is noted in this test, double-check the preceeding step.	If you can push the plunger all the way in, and it stays there when you release it, the diaphragm is defective. Install a new one, and re-test the unit.
Water Regulator Only: Air bubbles in the water system.	Defective O-ring on the connection tube at the syringe terminal.	Refer to the instructions for the syringe and follow the procedure described there.		If air bubbles still appear in the water system, proceed with the next step.
	Hole in the Regulator diaphragm	Conduct the Valve Test Syringe procedure described above. (The alternate method given above is not recommended for testing the Water Regulator.)	If no defect is noted, check for air in the water supply to the unit.	If you can push the plunger all the way in and it stays there when you release it, the diaphragm is defective. Install a new one, and re-test the unit.
Pressure creeps upward when the unit is not in use whether it is turned ON or OFF at the Master On-Off Valve.	Inlet seal is leaking.	Turn the Master On-Off Valve OFF, and bleed the system. Watch the system pressure gauge.	If the pressure stays at zero, check for a leaking inlet seal in the Pre-regulator.	If pressure builds back up after bleeding to zero, disassemble the regulator and inspect the inlet seal area. Replace any defective parts, and re-test the unit.

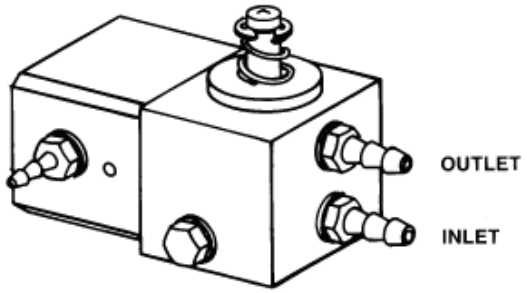
Pilot-Operated Regulators

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No Pressure at the regulator outlet when the Master On-Off Valve is ON and the Manual Shut-Off Valve is open.	Supply is shut off ahead of the Regulator.	Turn the Master On-Off Valve OFF, and bleed the system. Turn the Manual Shut-Off Valve OFF, and open the line on the outlet side, ahead of the Regulator. Cover the opening with a towel and briefly open the Manual Shut-Off Valve.	If there is a good strong flow, proceed with the next step.	If there is little or no flow, check the supply at its source.
	No pilot pressure to the Regulator.	Disconnect the "Signal Air" tube from the Regulator. Turn the Master On-Off Valve ON, and check for air coming from the tube.	If a flow of air is present, proceed with the next step.	No air flow means that the problem is upstream from the Regulator. Refer to the instructions for Pre-regulators.
	Improperly assembled Regulator.	Disassemble the Regulator and inspect all parts. Look for a diaphragm installed where the gasket belongs. The two parts are identical except that the gasket has a 9/16-inch hole in the center.	If no problem is found, assemble and re-test the unit.	If the Regulator was improperly assembled, re-assemble it with all parts in their proper positions. Re-test the unit.
Double-Diaphragm Regulators Only: Incorrect ratio of pilot pressure to outlet pressure.	Improperly installed diaphragm spacer.	Close the Manual Shut-Off Valves, then remove the cap from the water regulator and note the position of the diaphragm spacer. It should be installed so the side with the machined-out cavity faces toward the Regulator body.	If the spacer was installed properly, clean and inspect all parts. Replace any defective parts, assemble and re-test the unit.	If the spacer was improperly installed, assemble the Regulator correctly, and re-test the unit.
Leakage from the gasket or diaphragm area.	Improper assembly or loose screws.	Try tightening the screws. If the leaking persists, disassemble the Regulator and inspect the gasket, diaphragm, and sealing surfaces on the block and cap.	If all parts are in good condition, assemble and re-test the unit.	Replace any parts that are defective, and assemble and re-test the unit.
The system produces a loud, horn-like noise after being actuated.	Stem oscillation in the regulator body on the water side.	Replace the regulator assembly with Repair Kit B74-3 (for 24-0128-00 and 24-0129-00), or Repair Kit B74-4 (for 24-0138-00), then re-test the unit.	If the noise is no longer occurring, no further action is required.	If the noise continues, the problem may be with the house plumbing. Contact a plumber for information about noise arrestor equipment.
NOTES				

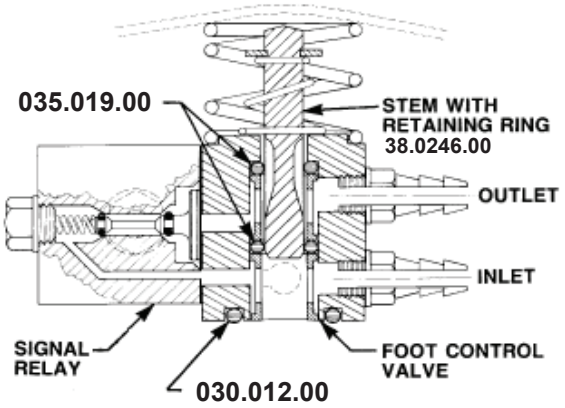
Foot Control II

DESCRIPTION The A-dec Foot Control II is actuated by foot pressure on the cover, which depresses the stem assembly in the valve bore. This moves the fluted surfaces of the stem below the inlet O-ring seal, allowing air to flow to the outlet. When foot pressure is released, the stem returns, sealing the inlet at the O-ring. Any pressure from the outlet side of the valve is then exhausted as the fluted surfaces move above the outlet O-ring seal.

The Signal Relay Valve is covered separately, in section T-7.



WARNING
Before removing the Foot Control cover, turn the air supply OFF and bleed all pressure from the system. If this is not done, the stem assembly may be ejected from the Foot Control valve. Never turn the air supply to the Foot Control ON when the cover is off the Foot Control, unless appropriate steps have been taken to ensure that the stem assembly cannot be ejected.



TROUBLESHOOTING GUIDE

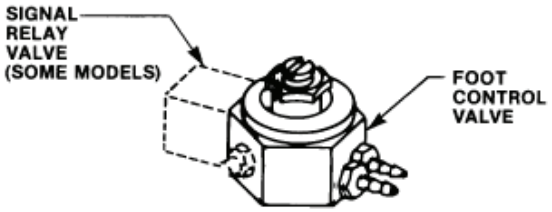
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Audible leakage while the Foot Control is not being used.	Loose mounting screws.	Turn the Foot Control face down and tighten the two phillips-head screws at the center of the baseplate.	If the leakage stops, no further action is required.	If the leakage does not stop, proceed with the next step.
	Loose connection.	Note "WARNING" in the description heading. Remove the Foot Control cover and use a soap solution, if necessary, to locate the source of the leakage. For leakage from the Signal Relay refer to the instructions covering the Signal Relay.	If the air is leaking around a barb connection, tighten the barb and re-test the valve.	If the air is leaking from the exhaust vent or around the bottom of the valve body, proceed with the next step.
	Defective O-rings or sealing surface.	Turn the unit OFF and bleed the air pressure, then disassemble the Foot Control. Inspect the O-rings and sealing surfaces for defects or debris.	If no defects are noted, carefully clean and lubricate the parts. Re-assemble and test the valve.	Replace any defective parts. Carefully clean and lubricate the parts. Re-assemble and test the valve.

Foot Control II

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Inadequate air flow from the Foot Control.	Inadequate air flow to the Foot Control.	Refer to the instructions for Regulators, and conduct the tests for "System pressure drops when the system is in use, then builds back up when it is not being used."	If these tests indicate that there is adequate air in the system, proceed with the next step.	If any of the tests indicates a problem in the air supply to the Foot Control, take the corrective action recommended.
	Pinched tubing going to or from the Foot Control.	Inspect the Foot Control tubing for crimps or restrictions.	If no problem is found, proceed with the next step.	If the tubing is crimped, install a new one, assemble and test the unit.
	Obstruction at the inlet or outlet.	Note "WARNING" in the description heading. With the cover removed, depress the piston and check for adequate air flow.	If no defects are noted, carefully clean and lubricate the parts. Re-assemble and test the valve.	Replace any defective parts. Carefully clean and lubricate all parts. Re-assemble and test the valve.
Foot Control is sluggish.	Sticking stem.	Note "WARNING" in the description heading. Remove the valve body from the base. Remove and inspect the O-rings and spacers for debris or defective parts.	If it works easily and smoothly, check for a weak or improperly installed spring.	If there is any sticking or binding. remove the stem, spacers, and O-rings. Replace any defective parts. Carefully clean and lubricate all parts. Re-assemble and test the valve.

NOTES

Foot Control Valve

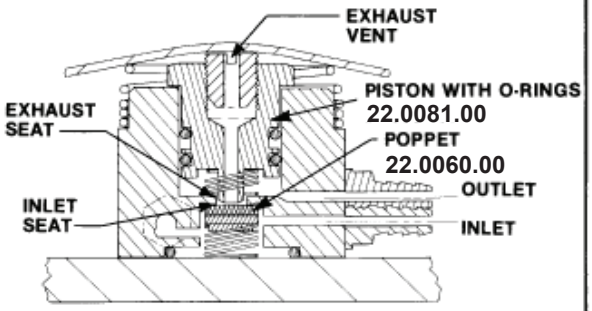


The A-dec foot control valve is actuated by foot pressure on the cover, which depresses the piston assembly in the valve bore. This seats the exhaust vent against the poppet and pushes the poppet away from the inlet seat, opening the valve. When foot pressure is released, the piston returns, closing the inlet and exhausting any pressure from the outlet side of the valve.

Adjustment

The 1979-1980 A-dec foot control requires no adjustment; however, foot controls manufactured before 1979 do have provision for adjusting the piston free travel.

The adjusting screw on the piston is pre-set at the factory and should never need to be re-adjusted. However, if field adjustment ever does become necessary, the procedure is as follows: (1) if there is too much free play or if the foot control does not put out full pressure, remove the cover and turn the screw a quarter-turn counter-clockwise; (2) if the foot control does not shut all the way off, remove the cover and turn the screw a quarter-turn clockwise; reassemble and test the foot control. If necessary, repeat these steps until proper performance is achieved.



TROUBLESHOOTING GUIDE

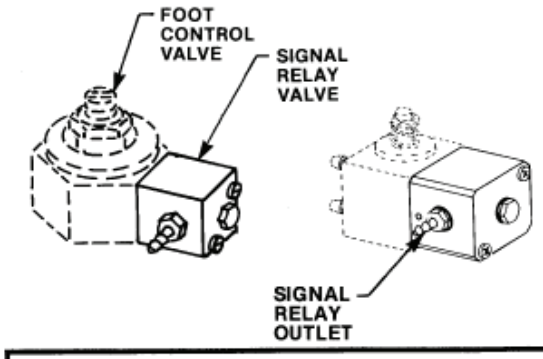
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Audible leakage while the Foot Control is not being used.	Loose mounting screws.	Turn the Foot Control face down and tighten the two phillips-head screws at the center of the baseplate.	If the leakage stops, no further action is required.	If the leakage does not stop, proceed with the next step.
	Loose connection.	Remove the Foot Control cover and use a soap solution, if necessary, to locate the source of the leakage. For leakage from the Signal Relay (if used), refer to the instructions covering the Signal Relay.	If the air is leaking around a barb connection, tighten the barb and re-test the valve.	If the air is leaking from the exhaust vent or around the bottom of the valve body, proceed with the next step.
	Defective o-ring, poppet, or inlet seat.	Turn the unit OFF and bleed the air pressure, then disassemble the Foot Control. For leakage around the bottom of the valve, inspect the O-ring and sealing surfaces for defects or debris. For leakage from the exhaust vent, inspect the poppet and inlet seat for defects or debris.	If no defects are noted, carefully clean and lubricate the parts. Re-assemble and test the valve.	Replace any defective parts. Carefully clean and lubricate all parts. Re-assemble and test the valve.
Inadequate air flow from the Foot Control.	Inadequate air flow to the Foot Control.	Refer to the instructions for Pilot-Operated Regulators, and conduct the tests for "System pressure drops when the system is in use, then builds back up when it is not being used."	If these tests indicate that there is adequate air in the system, proceed with the next step.	If any of the tests indicates a problem in the air supply to the Foot Control, take the corrective action recommended.

Foot Control Valve

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Pinched tubing going to or from the Foot Control.	Inspect the Foot Control tubing for crimps or restrictions.	If no problem is found, proceed with the next step.	If the tubing is crimped, install a new one, assemble and test the unit.
	Improper adjustment of the piston (too much free travel).	With the cover removed, step on the piston and check for adequate air flow.	If the air flow is good, follow the adjusting procedure given above.	If the air flow is stil inadequate, proceed with the next step.
	Defective poppet.	Remove the valve body from the base, and inspect the poppet.	If the poppet shows no visible defect, proceed with the next step.	If the poppet has flared or expanded enough to obstruct the inlet bore, replace it and re-test the unit.
	Obsolete base assembly.	If the base is made of plastic, return it to A-dec in exchange for a metal one (Part No. 38-0052-00) at no charge.		
Handpieces run too long after the Foot Control is released, or they may run momentarily when first lifted from their hangers.	Foot Control valve is not exhausting.	Remove the Foot Control cover. Depress then release the Foot Control piston. Check for air exhausting through the exhaust vent when you release the piston.	If the unit works properly only when the cover is removed, turn the piston adjusting screw clockwise to increase the free travel.	If the problem persists, remove the piston from the Foot Control, and check for an obstruction in the exhaust passage.
Foot Control is sluggish.	Sticking piston.	Remove the Foot Control cover, and work the piston by hand.	If it works easily and smoothly, check for a weak or improperly installed spring.	If there is any sticking or binding, remove and lubricate the piston with Silicone Lubricant. Re-assemble and test the unit.

NOTES

Signal Relay Valve

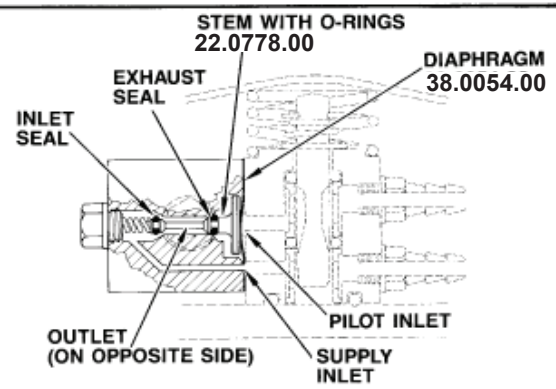


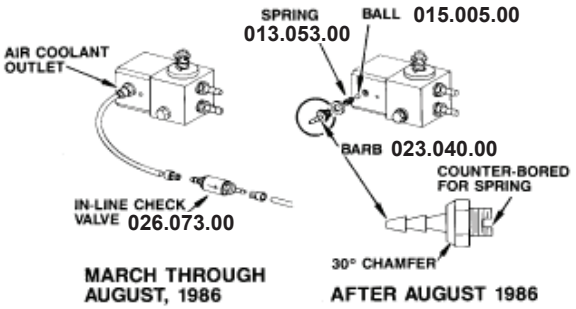
WARNING

Before removing the cover from the A-dec Foot Control II (identified by a black rather than gray retaining ring), turn the air supply OFF and bleed all pressure from the system. If this is not done, the stem assembly may be ejected from the Foot Control II valve. Never turn the air supply to the Foot Control ON when the cover is off the Foot Control unless appropriate steps have been taken to ensure that the stem assembly cannot be ejected.

The signal relay valve shown here is a pilot operated three-way valve that mounts on the foot control valve body to provide handpiece air coolant and the handpiece water coolant signal. The valve is actuated by air pressure from the foot control valve outlet. This deflects the diaphragm and moves the stem, to close the exhaust seal and open the inlet seal. A flow of air, at regulated supply pressure, passes through the signal relay valve to the outlet. When the foot control is released, the diaphragm and stem return to their original positions, closing the inlet seal and exhausting any pressure at the outlet.

NOTE: Foot controls manufactured after August, 1986 have a check valve (consisting of a ball, spring, and special barb) incorporated into the air coolant port of the signal relay. The check valve causes air coolant to exhaust at the handpiece rather than through the signal relay. The exhausting air coolant helps pull latent water coolant droplets out of the water coolant tubing, rather than allowing them to be retracted back into the tubing. The process was instigated as an aid to infection control. Some units manufactured in 1986, including all lever foot controls, have an in-line check valve instead.





TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No signal from the Signal Relay Valve.	Signal Relay installed upside down.	Visually check the Signal Relay Valve. It must be positioned as shown in the illustration in order for the inlet passage to line up with the passage on the Foot Control Valve body.	If the Signal Relay is properly installed, proceed with the next step.	If the Signal Relay is installed wrong, remove it and install it properly. Re-test the valve.
	Defective or improperly installed diaphragm.	Remove the Signal Relay from the Foot Control and check for defects, debris, or improper installation. The holes in the diaphragm must be aligned with the passages in the valve bodys.	If no defects are noted, clean all parts. Re-assemble and test the valve.	Replace any defective parts. Re-assemble valve, making sure all parts are properly installed.
Air signal from the Signal Relay does not shut off.	The Foot Control Valve fails to exhaust.	This is likely to be a problem only on units that have an air-actuated electric switch operated by the Foot Control Valve (see Page No. C-4). Flip the Handpiece Selector toggle and see if the air signal from the Signal Relay shuts off.	If it does, the Foot Control Valve is not exhausting. Refer to the instructions for the Foot Control Valve.	If it does not, proceed with the next step.

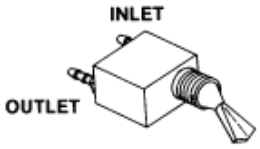
Signal Relay Valve

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	The stem return spring is missing.	Remove the hex plug from the end of the Signal Relay Valve and verify that the spring is in place.	If the spring is there, proceed with the next step.	If the spring is missing or defective, replace it and re-test the valve.
	The valve stem is stuck in the open position.	Disassemble the Signal Relay Valve and inspect all parts for defects, debris, or improper installation.	If no defects are found, carefully clean all parts. Lubricate the stem and O-rings, then re-assemble and test the valve.	Replace any defective parts. Lubricate the stem and O-rings, then re-assemble and test the valve.
Audible air leakage while the unit is not in use.	Improper seating of the diaphragm.	Note "WARNING" in the description heading. Use a soap solution, if necessary, to locate the source of leakage.	If the leakage is from the exhaust holes on the sides of the Signal Relay, proceed with the next step.	If the leakage is at the diaphragm line, tighten the Signal Relay mounting screws. If leakage persists, replace the diaphragm.
	Signal Relay inlet seal does not fully close.	If the leakage is from the exhaust holes, shut the unit OFF, then remove the Signal Relay from the Foot Control. Inspect the stem, O-rings, and seats for debris or defects.	If no defects are noted, carefully clean and lubricate the parts. Re-assemble and test the valve.	Replace any defective parts. Clean and lubricate the parts, then re-assemble and test the valve.
Audible air leakage while the unit is in use.	Improper seating of the diaphragm.	Depress the Foot Control until the relay is actuated. While listening to the leak, depress the Foot Control all the way.	If there is no change in the sound of the leak, proceed with the next step.	If the leaking increases with pressure on the Foot Control, tighten the Signal Relay mounting screws. If leakage persists, replace the diaphragm.
	Signal Relay exhaust seal does not fully close.	Note "WARNING" in the description heading. While the Foot Control is depressed, check for leakage out of the exhaust holes in the Signal Relay body.	If there is no leakage from the holes, check the outlet barb and tubing. Tighten the barb or the sleeve, as necessary to stop the leak.	If air comes from the exhaust holes, inspect the exhaust seal area for debris or defects. Replace any defective parts. Clean and lubricate all parts, then re-assemble and test the valve.

Three-Way Control Valves

026.050.00

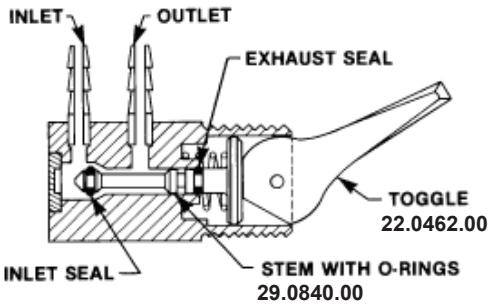
33.0048.00



33.0080.00

The illustrations show the three-way (exhausting) control valves most commonly used in A-dec equipment. They are identical in function, and may be interchanged with one another. These valves are used as Master On-Off, Air Coolant On-Off, Water Coolant On-Off, and Century Arm Brake valves.

These valves are serviced by pushing the toggle pin out of the neck of the valve body and removing the toggle, stem, and spring. When assembling the valve, note that the toggle can be installed in any of four different positions, so it is necessary to ensure that it is installed to match the lettering on the faceplate of the unit.



NOTE THAT THE INTERNAL PARTS OF ALL THESE VALVES ARE IDENTICAL.

TROUBLESHOOTING GUIDE

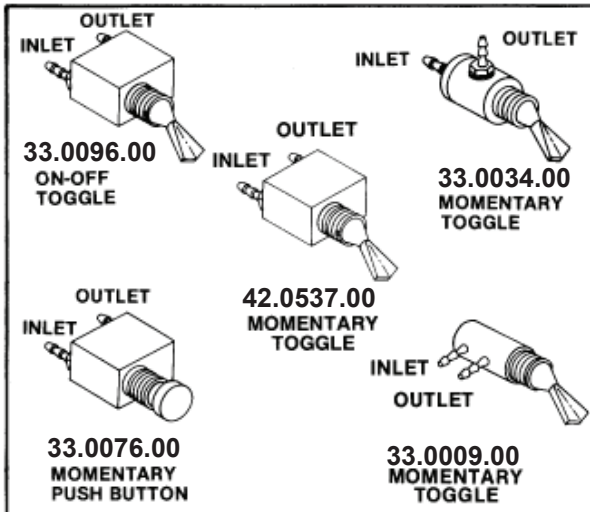
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Audible leakage when the valve is OFF.	Inlet seal does not fully close.	Turn the valve ON, and listen for continued leakage.	If the leaking continues, look for a loose connection at the inlet fitting.	If the leaking stops, inspect the inlet seal area. Replace any defective parts. Re-assemble and test the valve.
Leakage from the valve when it is turned ON.	Loose connection at the outlet fitting.	Use a soap solution, if necessary, to determine the point of leakage.	If the air is escaping around the toggle, proceed with the next step.	If the leak is at the outlet barb, tighten or replace the barb, sleeve, or washer, as necessary.
	Exhaust seal does not fully close.	Clamp off the tube connected to the inlet with a hemostat, then disassemble the valve. Inspect all parts in the exhaust seal area for defects or debris.	If no defects are found, clean and lubricate all parts, then re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.
Valve does not exhaust when it is turned OFF.	The exhaust seal O-ring is installed in the wrong groove on the stem (This applies only to **stems** manufactured after mid-1978).	With a hemostat, clamp off the tube connected to the inlet, then disassemble the valve. Of the two closely spaced grooves near the head of the stem, the exhaust seal O-ring belongs in the one closer to the head. The other groove should be empty. (Stems manufactured before mid-1978 do not have this groove.)	If the O-ring is correctly installed, look for debris in the exhaust seal area. Clean and lubricate the parts. Re-assemble and test the valve.	If the O-ring is in the wrong groove, move it to the correct one. Re-assemble and test the valve.

Three-Way Control Valves

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Loose toggle.	The toggle pin is part way out.	Visually inspect the pin and the valve mounting nut. The outer nut should cover the toggle pin holes to keep the pin in place.	If the toggle pin is still in place, the hole in the toggle is worn, so a new toggle should be installed.	If the pin is loose, work it into place and install the mounting nut so it covers the toggle pin holes.

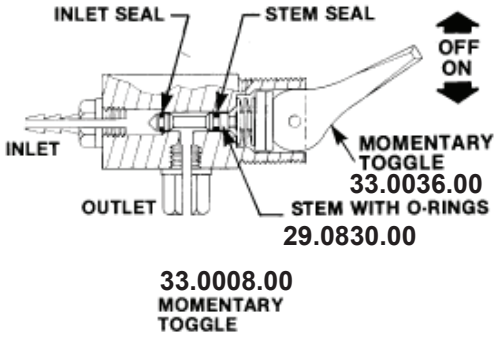
NOTES

Two-Way Control Valve



The illustrations show the two-way (non-exhausting) control valves most commonly used in A-dec equipment. They can be used for either air or water, and are used for cuspidor bowl rinse and cup filler valves.

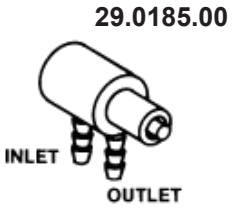
These valves are serviced by pushing the toggle pin out of the neck of the valve body and removing the toggle (or button), stem, and spring. When assembling toggle valves, note that the toggle can be installed in any of four different positions, so it is necessary to ensure that it is installed to match the lettering on the unit where the valve is used.



TROUBLESHOOTING GUIDE

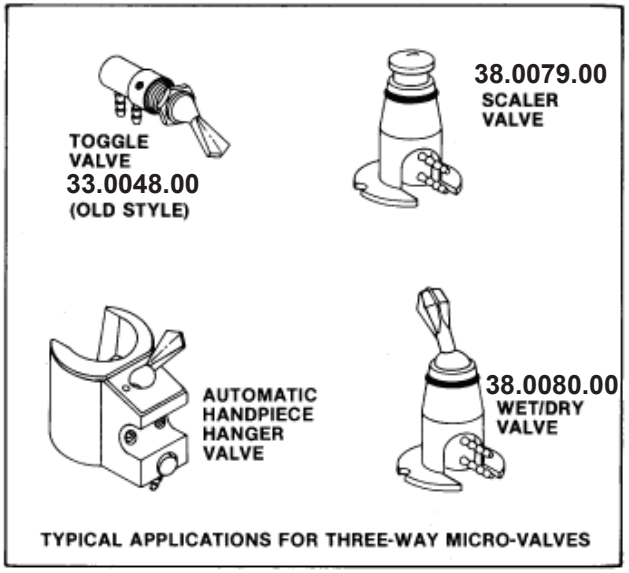
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Air leaks past the valve when it is OFF	Inlet seal does not fully close.	Disconnect the tube from the Toggle Valve outlet, and listen for escaping air when the valve is OFF.	If there is no leakage, re-connect the tube and re-test the unit.	If there is any leakage, inspect the inlet seal area. Replace any defective parts. Re-assemble and test the valve.
Air leakage around the neck of the valve when it is turned ON, and/or downstream pressure exhausts when the valve is turned OFF.	Leakage past the stem seal.	Use a pair of hemostats to clamp off the tube connected to the inlet fitting, then disassemble the valve. Inspect all internal parts and surfaces for debris or defects.	If no defects are found, proceed with the next step.	Replace any defective parts. Re-assemble and test the valve.
	The stem seal O-ring is installed in the wrong groove on the stem. (This applies only to stems manufactured after mid-1978.)	Disassemble the valve and inspect the stem. Of the two closely-spaced groves near the head end of the stem, the O-ring belongs in the one further from the head. The groove closer to the head should be empty. (Stems manufactured before mid-1978 do not have this extra groove.)	If the O-ring is correctly installed, look for debris in the stem seal area. Re-assemble and test the valve.	If the O-ring is in the wrong groove, move it to the correct one. Re-assemble and test the valve.
Loose toggle.	The toggle pin is part way out.	Visually inspect the pin and the valve mounting nut. The outer nut should cover the toggle pin holes, to keep the pin in place.	If the toggle pin is still in place, the hole in the toggle is worn, so a new toggle should be installed.	If the pin is loose, work it into place and install the mounting nut so it covers the toggle pin holes.

Three-Way Micro-Valve

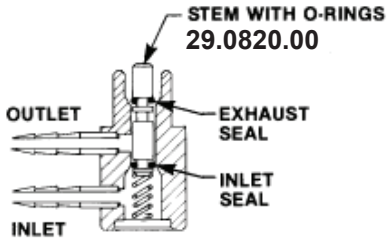


The three-way (exhausting) micro-valve is designed for mounting in a variety of different actuators to perform a number of functions, as illustrated.

While it is normally considered a consumable item, the micro-valve can be serviced by removing it from its actuator and extracting the stem and spring.



TYPICAL APPLICATIONS FOR THREE-WAY MICRO-VALVES



TROUBLESHOOTING GUIDE

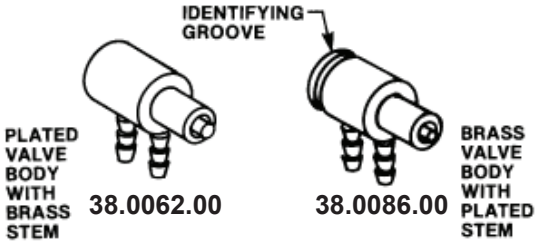
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Audible leakage when the valve is OFF.	Improper positioning of the Micro-Valve in its mount.	Loosen the set screw in the mount, and move the Micro-Valve out slightly while listening for continued leakage.	If the leaking stops, tighten the set screw to lock the valve in position.	If the leaking continues, proceed with the next step.
	Inlet seal does not fully close.	Turn the Micro-Valve ON, and listen for continued leakage.	If the leaking continues, look for a loose connection on the inlet barb.	If the leaking stops, inspect the inlet seal area. Replace any defective parts. Re-assemble and test the valve.
Leakage from the valve when it is turned ON.	Improper positioning of the Micro-Valve in its mount.	Loosen the set screw and push the Micro-Valve further into its mount, while listening for continued leakage.	If the leaking stops, tighten the set screw to lock the valve in place.	If the leaking continues, proceed with the next step.
	Exhaust seal does not fully close.	With a hemostat, clamp off the tube connected to the inlet barb, then disassemble the valve. Inspect all parts in the exhaust seal area for defects or debris.	If no defects are found, re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.

Three-Way Micro-Valve

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Valve does not exhaust when it is turned OFF.	Improper positioning of the Micro-Valve in its mount.	Loosen the set screw in the mount, and move the Micro-Valve out slightly while listening for a short burst of air exhausting from the valve.	If the valve exhausts, tighten the set screw to lock the valve in position.	If the valve still does not exhaust, proceed with the next step.
	The exhaust seal O-ring is installed in the wrong groove on the stem. (This applies only to stems manufactured after mid-1978.)	With a hemostat, clamp off the tube connected to the inlet barb, then disassemble the valve. Of the two closely-spaced grooves in the exhaust end of the stem, the exhaust seal O-ring belongs in the one closer to the end. The other groove should be empty. (Stems manufactured before mid-1978 do not have this groove.)	If the O-ring is correctly installed, look for debris in the exhaust seal area. Re-assemble and test the valve.	If the O-ring is in the wrong groove, move it to the correct one. Re-assemble and test the valve.
No air flows through the valve when it is turned ON.	Improper positioning of the Micro-Valve in its mount.	Loosen the set screw, and push the Micro-Valve further into the mount. Tighten the set screw and test the valve.	If it works properly, no further action is required.	If the valve still does not work, proceed with the next step.
	No air pressure at the valve inlet.	Disconnect the tube from the inlet barb and check for air coming from the tube.	If air is present, proceed with the next step.	If no air comes from the tube, look for a problem upstream from the valve.
	Debris inside the Micro-Valve.	Clamp off the inlet tube with a hemostat, then disassemble the valve and inspect for defects or debris.	If no debris or defects are noted, look for a blockage in the tubing on the downstream side of the valve.	Clean all parts and lubricate the stem and O-rings. Re-assemble and test the valve.

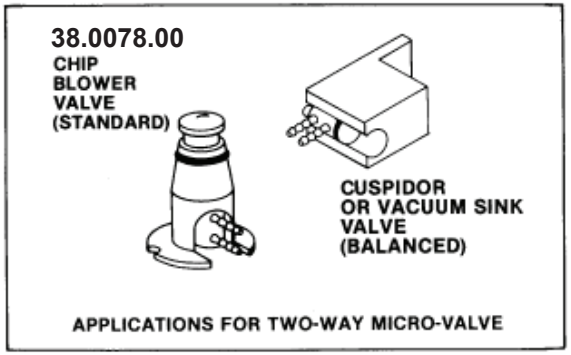
NOTES

Two-Way Micro-Valves

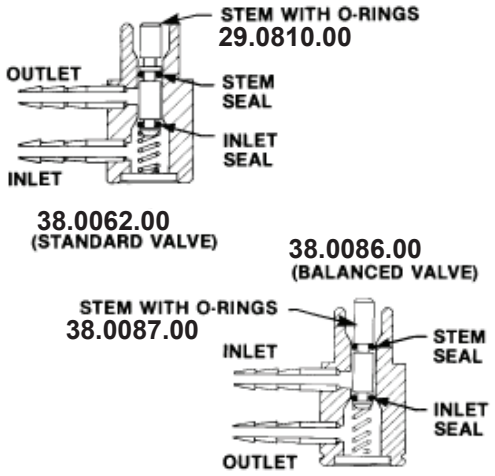


The two-way (non-exhausting) micro-valve is designed for mounting in different actuators, as illustrated. *It is important to recognize that there are two distinctly different types of two-way micro-valves, standard and balanced.* The identifying features are noted on the illustrations. *These valves are not interchangeable nor are any of their component parts.*

These valves are normally considered to be consumable items, however they can be serviced by removing them from their actuators and extracting the stems and springs.



APPLICATIONS FOR TWO-WAY MICRO-VALVE



TROUBLESHOOTING GUIDE

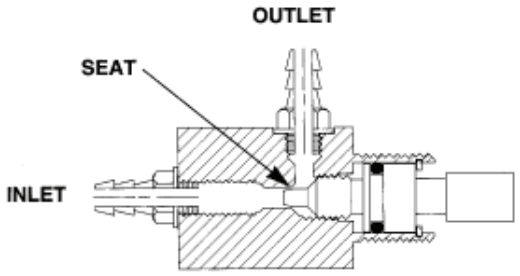
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Air leaks past the valve when it is turned OFF.	Improper positioning of the Micro-Valve in its mount.	Loosen the set screw in the mount, and move the Micro-Valve out slightly, while listening for continued leakage.	If the leaking stops, tighten the set screw to lock the valve in position.	If the leaking continues, proceed with the next step.
	Inlet seal does not fully close.	Turn the Micro-Valve ON, and listen for continued leakage.	If the leaking continues, look for a loose connection on the inlet barb.	If the leaking stops, inspect the inlet seal area. Replace any defective parts. Re-assemble and test the valve.
Air leakage around the stem when the valve is ON, and/or downstream pressure exhausts when the valve is turned OFF.	Leakage past the stem seal.	Use a hemostat to clamp off the tube connected to the inlet barb, then disassemble the valve. Inspect all internal parts and surfaces for debris or defects.	If no defects are observed, proceed with the next step.	Replace any defective parts. Re-assemble and test the valve.
	The stem seal O-ring is installed in the wrong groove on the stem. (This applies only to stems manufactured after mid-1978.)	Disassemble the Micro-Valve and inspect the stem. Of the two closely-spaced grooves in the outlet end of the stem, the O-ring belongs in the one further from the end. The groove closer to the end should be empty. (Stems manufactured before mid-1978 do no have this groove.)	If the O-ring is correctly installed, look for debris in the valve. Clean and lubricate the parts. Re-assemble and test the valve.	If the O-ring is in the wrong groove, move it to the correct one. Re-assemble and test the valve.

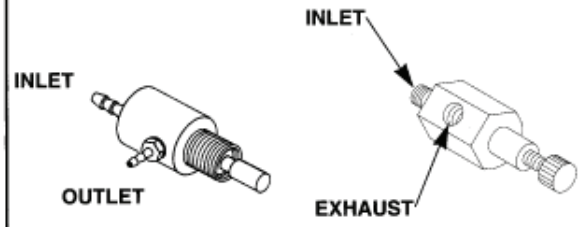
Two-Way Micro-Valves

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No air flows through the valve when it is turned ON.	Improper positioning of the Micro-Valve in its mount.	Loosen the set screw, and push the Micro-Valve further into the mount. Tighten the set screw and test the valve.	If the valve works properly, no further action is required.	If the valve still does not work, proceed with the next step.
	No air pressure at the valve inlet.	Disconnect the tube from the inlet barb and check for air coming from the tube.	If air is present, proceed with the next step.	If no air comes from the tube, look for a problem upstream from the valve.
	Debris inside the Micro-Valve.	Clamp off the inlet tube with a hemostat, then disassemble the valve and inspect for debris or defects.	If no debris or defects are noted, look for a blockage in the tubing on the downstream side of the valve.	Clean all parts and lubricate the stem and O-rings, then re-assemble and test the valve.

NOTES

Needle Valves





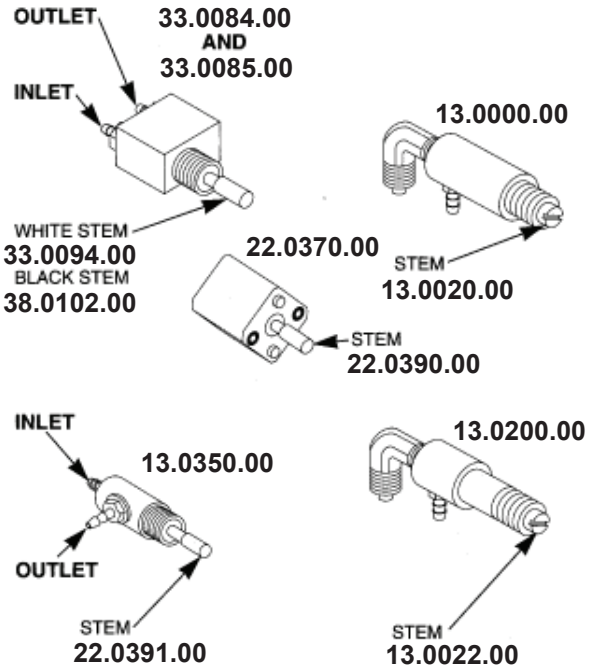
13.0361.00 AND 13.0379.00

026.100.00 TIME CONTROL NEEDLE VALVE

The illustrations show the needle valves most commonly used in A-dec equipment. They are used to perform a variety of air and water flow control functions.

Note that needle valves 33-0084-00 and 33-0085-00, while identical in external appearance, have different stems and are engineered to perform different functions: 33-0085-00, identified by its white stem, is a general purpose needle valve; and 33-0084-00, identified by its black stem, is for "fine" flow adjustments.

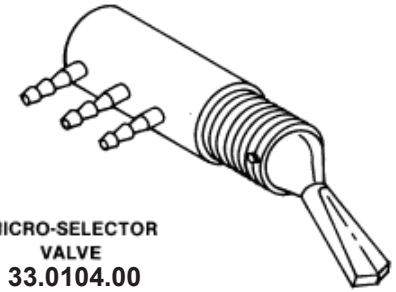
Note that needle valves 13-0361-00 and 13-0379-00 provide identical functions. The two needle valves differ only in barb size and retaining nut styles.



TROUBLE SHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No flow through the Needle Valve.	Obstruction in the barb or valve body.	Verify that there is flow at the valve inlet, then turn the control knob counter-clockwise to open the valve.	If the valve begins to work, adjust it for the desired rate of flow.	If the valve remains blocked, clamp the inlet tube, then disassemble the valve. Carefully clean and lubricate the parts, then reassemble and test the valve.
Leakage around the stem.	Defective O-ring seal around the stem.	Use a hemostat to clamp off the tube connected to the inlet barb, then disassemble the valve. Inspect all internal parts and surfaces for defects or debris.	If no defects are found, reassemble and test the valve.	Replace any defective parts. Reassemble and test the valve.
Flow cannot be adjusted.	Stripped threads on the stem.	Use a hemostat to clamp off the tube connected to the inlet barb, then disassemble the valve. Inspect all internal parts and surfaces for defects or debris.	If no defects are found, reassemble and test the valve.	Replace any defective parts. Reassemble and test the valve.

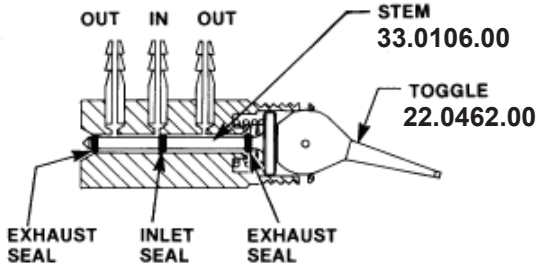
Micro-Selector Valve



MICRO-SELECTOR VALVE
33.0104.00

The A-dec Micro-Selector valve is a toggle actuated miniature selector valve that applies pressure to either of two outlet ports from a single inlet port. While pressure is applied to one of the outlet ports, air pressure at the other outlet port is released past the exhaust seal. This valve is used as the Handpiece Selector in Century II manual control systems.

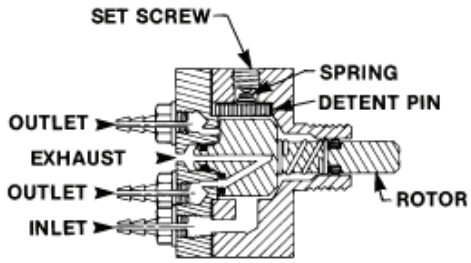
The Micro-Selector Valve can be serviced without disconnecting any tubing. Turn the unit OFF, then remove the faceplate nut and pull the valve into the unit. Remove the toggle, stem, and spring from the valve body.

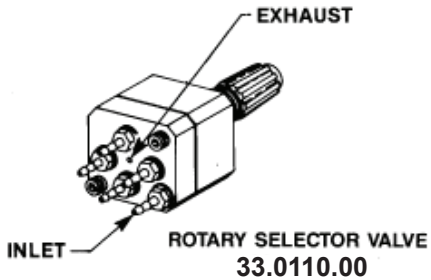


TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Air leakage around the barbs.	Loose or damaged tubing at the barb connection.	Determine which of the barb connections is leaking, then slide the Uni-Clamp sleeve back and see if the tubing is all the way on the barb. Check for damaged tubing in the area of the leak.	If the tubing is loose or damaged, clip off the end, and re-connect it, using a new Uni-Clamp.	If the leak is at the point where the barb is attached to the valve body, replace the valve.
Air leaking from one of the exhaust outlets.	Defective O-ring seal.	Flip the toggle and see if the air stops leaking altogether, or stops leaking from one exhaust outlet and starts leaking from the other. (One exhaust outlet is on the rear end of the valve body, and the other is around the toggle.)	If the leaking stops altogether, the exhaust seal is defective. Install a new exhaust seal O-ring and make sure the seat is clean. Re-assemble and test the unit.	If air leaks alternately from either exhaust outlet, depending on which way the toggle is flipped, the inlet seal is defective. Install new O-rings on the stem, then re-assemble and test the unit.
	Defects in the bore of the valve body.	If replacing the O-rings on the stem fails to correct the problem, the valve body is probably defective.		Install a new Micro-Selector Valve, then re-test the unit.
No air from one or both of the outlet barbs.	Clogged barb.	If no air comes from either of the barbs, it is probably the inlet barb that is clogged. If air comes from one outlet but not from the other, that barb is clogged.		Disassemble the valve and disconnect the tubing from the barbs. Run a wire through the barbs, and thoroughly clean all internal passages. Reassemble and test the unit.

Rotary Selector Valve





ROTARY SELECTOR VALVE
33.0110.00

Description

The A-dec Rotary Selector Valve is used in Century II manual control systems to route holdback air the the control blocks. Air pressure is directed from a single inlet port to three of the four outlet ports. The fourth outlet port is vented through the exhaust hole, releasing the holdback air pressure from the control block and allowing that handpiece to be operated.

Pressurized air fills the valve chamber and flows directly to three of the four outlet ports. An O-ring seals the fourth outlet port, preventing air pressure from entering the port, while venting any air pressure downstream from the port through the center of the rotor and out the exhaust hole. As the valve rotor is rotated to the next position, the same function is performed at the next outlet port. When fewer than four positions are required, the unused outlet ports are plugged.

The Rotary Selector Valve can normally be serviced without disconnecting the tubing or removing the rotor. Since reinstallation is somewhat time-consuming, **the rotor should not be removed** from the valve body unless the spring or O-ring on the shaft must be serviced.

Remove the knob and faceplate nut, then pull the valve into the unit. Prevent accidental removal of the rotor by reinstalling the knob. Remove the two capscrews from the back of the valve, and separate the valve body from the manifold. Leave the manifold attached to the tubing.

If it does become necessary to remove the rotor, be careful not to lose the detent pin and spring, which will also come out. To reinstall the rotor, first remove the set screw from the valve body. Lubricate the O-ring on the rotor shaft, then insert the rotor into the valve body. Slip the detent pin into the notch in the rotor. Drop the spring into position with the larger end on the detent pin. Apply a drop of Loctite® No. 242 (or equivalent thread sealer) to the set screw, then install the set screw in the valve body. Screw it down only until it is flush with the surface of the valve body. Allow 30 minutes for the sealant to dry before applying air pressure to the valve.

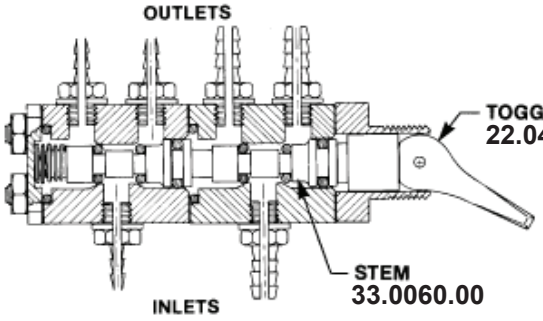
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Rotor is hard to turn.	Insufficient lubricant.	Disassemble the valve and inspect the O-rings for lubricant.		Carefully clean and lubricate all parts. Reassemble and test the valve.
Air leaks out a barb that is supposed to be closed.	Defective O-ring.	Disassemble the valve and inspect the O-ring on the flat face of the rotor for defects and adequate lubrication.	If there are no apparent defects, reassemble and test the valve.	Replace any defective parts. Reassemble and test the valve.
Air leaking from the exhaust outlet.	Defective O-ring seal.	Turn the unit OFF and bleed the air pressure, then disassemble the valve. Inspect the O-rings and sealing surfaces for defects or debris.	If no defects are noted, carefully clean and lubricate the parts. Reassemble and test the valve.	Replace any defective parts. Carefully clean and lubricate all parts. Reassemble and test the valve.

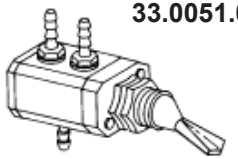
Rotary Selector Valve

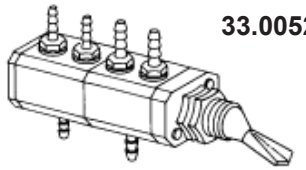
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Defects in the bore or surface of the valve manifold.	If replacing the O-rings on the rotor fails to correct the problem, the manifold is probably defective.		Install a new Rotary Selector Valve, then retest the part.
External leakage from the valve.	Loose fasteners.	Tighten the capscrews on the back of the valve.	If leakage stops, no further action is required.	If leakage persists, proceed with the next step.
	Defective gasket seal.	Inspect the manifold sealing surface and the gasket for defects.	If no defects are noted, re-assemble and test the valve.	Replace any defective parts. Reassemble and test the valve.
	Defective O-ring seal on the rotor shaft.	If the air is leaking around the neck of the rotor, disassemble the valve and inspect the O-ring for defects. If the air is leaking around the rotor shaft, disassemble the valve and inspect the O-ring for defects.	If there are no apparent defects, make sure the O-ring is the correct size.	Replace any defective parts. Reassemble and test the valve.
Air leakage around the barbs.	Loose or damaged tubing at the barb connection.	Determine which of the barb connections is leaking, then slide the Uni-Clamp sleeve back and see if the tubing is all the way on the barb. Check for damaged tubing in the area of the leak.	If the leak is at the point where the barb is attached to the valve body, proceed with the next step.	If the tubing is loose or damaged, clip off the end, and re-connect it, using a new Uni-Clamp.
	Loose barb or damaged washer.	Use a soap solution, if necessary, to locate the source of the leakage. Inspect the barb and washer for proper seal.	If the air is leaking around a barb connection, tighten the barb and re-test the valve.	If the leak continues after tightening the barb, then replace the washer and retest the valve.
No air from one or any of the outlet barbs.	Clogged barb.	If no air comes from any of the barbs, it is probably the inlet barb that is clogged. If air comes from some outlet barbs but not from another, that barb is clogged.		Disassemble the valve and disconnect the tubing from the barbs. Run a wire through the barbs, and thoroughly clean all internal passages. Reassemble and test the unit.

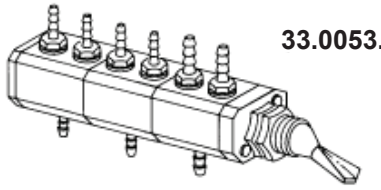
NOTES

Routing and Selector Valves







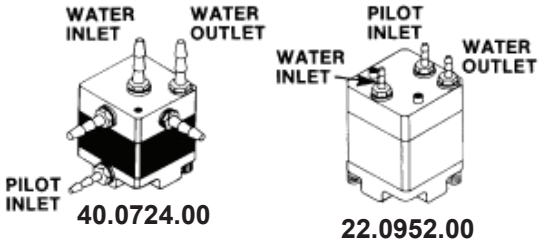


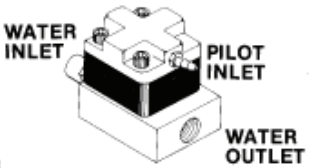
The routing and selector valves are toggle actuated, single, double, or triple three-way valves, as shown. Flipping the toggle routes the air or water from the inlet to one or the other of the outlets. They are used as handpiece selectors in A-dec manual control systems.

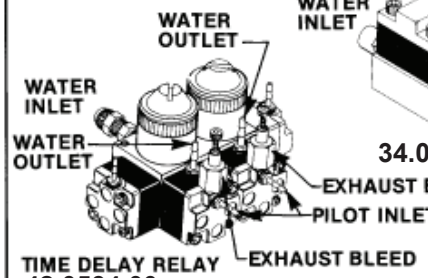
TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
External leakage from the valve.	Loose fasteners.	Tighten the nuts on the back of the valve to stop leakage at the joints. Tighten the barbs or replace the nylon washers to stop leakage around them.	If leakage stops, no further action is required.	If leaking persists, replace the O-rings on the joints. Re-assemble and test the valve.
	Defective O-ring seal on the stem (applies only to leakage around the toggle.)	If there is air leaking around the toggle, disassemble the valve and inspect the O-rings, stem, and bore for defects.	If there are no apparent defects, make sure the O-ring is of the proper size.	Replace any defective parts. Re-assemble and test the valve.
Air leaks out a barb that is supposed to be closed.	Defective O-ring.	Disassemble the valve and inspect the O-rings, stem, and bore for defects and adequate lubrication.	If there are no apparent defects, re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.
Toggle cannot be switched.	The piston is installed wrong end first.	Remove the toggle pin and toggle. Look at the exposed end of the piston. If there is a raised area in the center of the piston, it is installed wrong.	If the piston is properly installed, disassemble the valve and look for debris that is jamming the stem.	Remove the piston, and install it so the flat end faces outward. Re-install the toggle and pin.

Water Relays

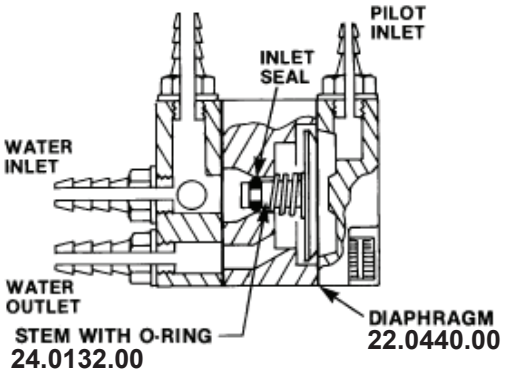






The valves shown here are pilot operated two-way water relays. They are used in a variety of different applications in A-dec systems.

The pilot signal pressurizes the area behind the diaphragm, moving the stem to unseat the inlet seal and open the valve. When pilot pressure is released, the diaphragm relaxes and allows the stem to withdraw. This closes the inlet seal and creates a momentary low pressure at the outlet that draws a small amount of water back into the valve, resulting in a water retraction function.



TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Air bubbles in the water, causing sputtering and spurting.	Defective O-ring on the connector tube at the syringe terminal.	Refer to the instructions for the syringe and follow the procedure described there.		If air bubbles still appear in the water system, proceed with the next step.
	Leaking diaphragm in the Water Regulator (Water Relay Valve okay).	Turn the Master On-Off Valve OFF, then disconnect the water supply tube from the Water Relay Valve. Turn the Master On-Off Valve ON and check for air bubbles in the water.	If the water runs smoothly, without air bubbles, reconnect the tube and proceed with the next step.	If there is air in the water, refer to the instructions for Pilot-Operated Regulators for the test procedure.
	Leaking diaphragm in the Water Relay Valve.	Turn the Master On-Off Valve OFF, then remove the cover from the Water Relay Valve. Remove and inspect the diaphragm.	If there is no defect in the diaphragm, reassemble and test the valve.	Replace the diaphragm if it is defective. Reassemble and test the valve.
Water Relay Valve does not completely shut off.	Defective O-ring seal on the end of the stem.	Disassemble the Water Relay Valve and inspect the O-ring, stem, and seat for defects or debris.	If there are no defects or debris, check to see if the signal to the Water Relay Valve shuts off fully.	Replace any defective parts. Reassemble and test the valve.

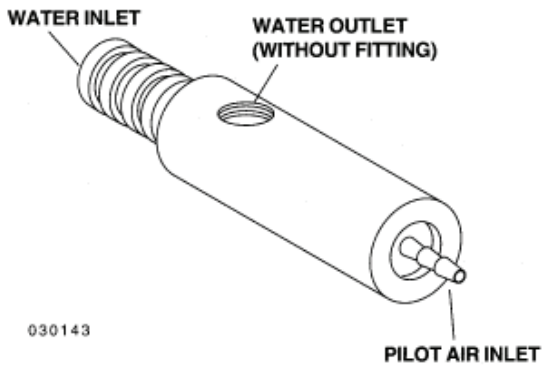
Water Relays

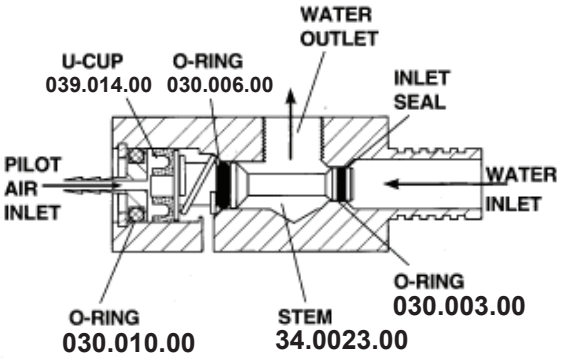
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No water retraction (when the Water Relay Valve is used for handpiece coolant).	Restricted exhaust in the Signal Relay on the Foot Control.	Refer to the Signal Relay instructions for the test procedures for this problem.	If the Signal Relay Valve works properly, proceed with the next step.	Follow the instructions given with the test procedure.
	Defective return spring in the Water Relay Valve.	Disassemble the Water Relay Valve and inspect the return spring for defects.	If there are no defects, verify that it is the correct, spring, then reassemble and test the valve.	Replace the spring if it is defective. Reassemble and test the valve.
Relay does not operate.	No water supply to the Water Relay Valve.	Turn the Master On-Off Valve OFF, then disconnect the water supply tube from the inlet on the Water Relay Valve or the Utility Module. Turn the Master On-Off Valve ON momentarily and check for water coming from the tube.	If water flows from the tube, reconnect it and proceed with the next step.	If no water comes from the tube, trace backward through the system to determine where the supply is interrupted.
	No air signal to the Water Relay Valve.	Turn the Master On-Off Valve OFF, then disconnect the air signal tube from the inlet on the Water Relay Valve. Turn the Master On-Off Valve ON, and actuate the air signal to the Water Relay. Check for air flow from the disconnected tube.	If air is flowing from the tube, reconnect it and proceed with the next step.	If there is no air signal, trace backward through the system to locate the obstruction.
	Obstruction in the system downstream from the Water Relay Valve.	Disconnect the water outlet tube from the Water Relay Valve. Actuate the valve and check for water flow at the outlet.	If water comes from the outlet, the Water Relay Valve is okay. Reconnect the tube, and trace the system downstream from the Water Relay Valve.	If no water comes from the outlet, proceed with the next step
	Stuck stem or other internal obstruction.	Turn the Master On-Off Valve OFF, then remove the cover from the Water Relay Valve. Remove the diaphragm, diaphragm plate, stem, and return spring. Carefully inspect all parts for defects or debris.	If all parts are clean and have no defects, reassemble and test the valve.	Replace any defective parts. Reassemble and test the valve.

NOTES

Water Shut-Off Valves

34.0017/18/21/27/29/.00

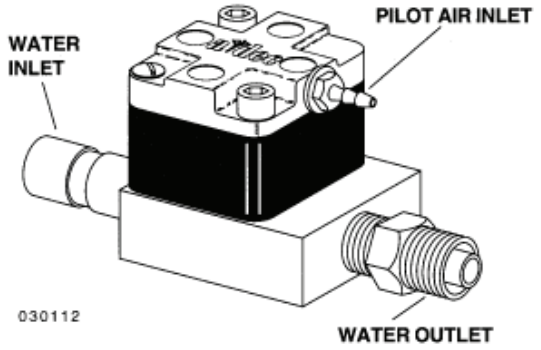


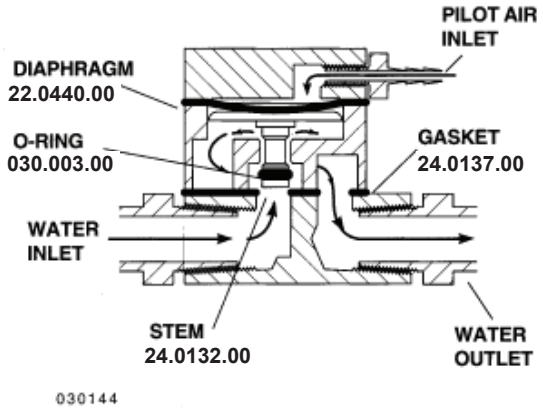


The Water Shut-Off Valves are pilot-operated two-way water relays. They are used to provide positive water shut-off at the Manual Shut-Off Valve in a variety of A-dec systems. The valve to the left has also been used as a simple relay in the A-dec Water Saliva Ejector system.

The pilot signal pressurizes the area behind the U-cup or diaphragm, moving the stem to unseat the inlet seal o-ring and open the valve. When the pilot pressure is released, the U-cup or diaphragm relaxes allowing the stem o-ring to seat, closing the valve.

34.0031/32/33.00





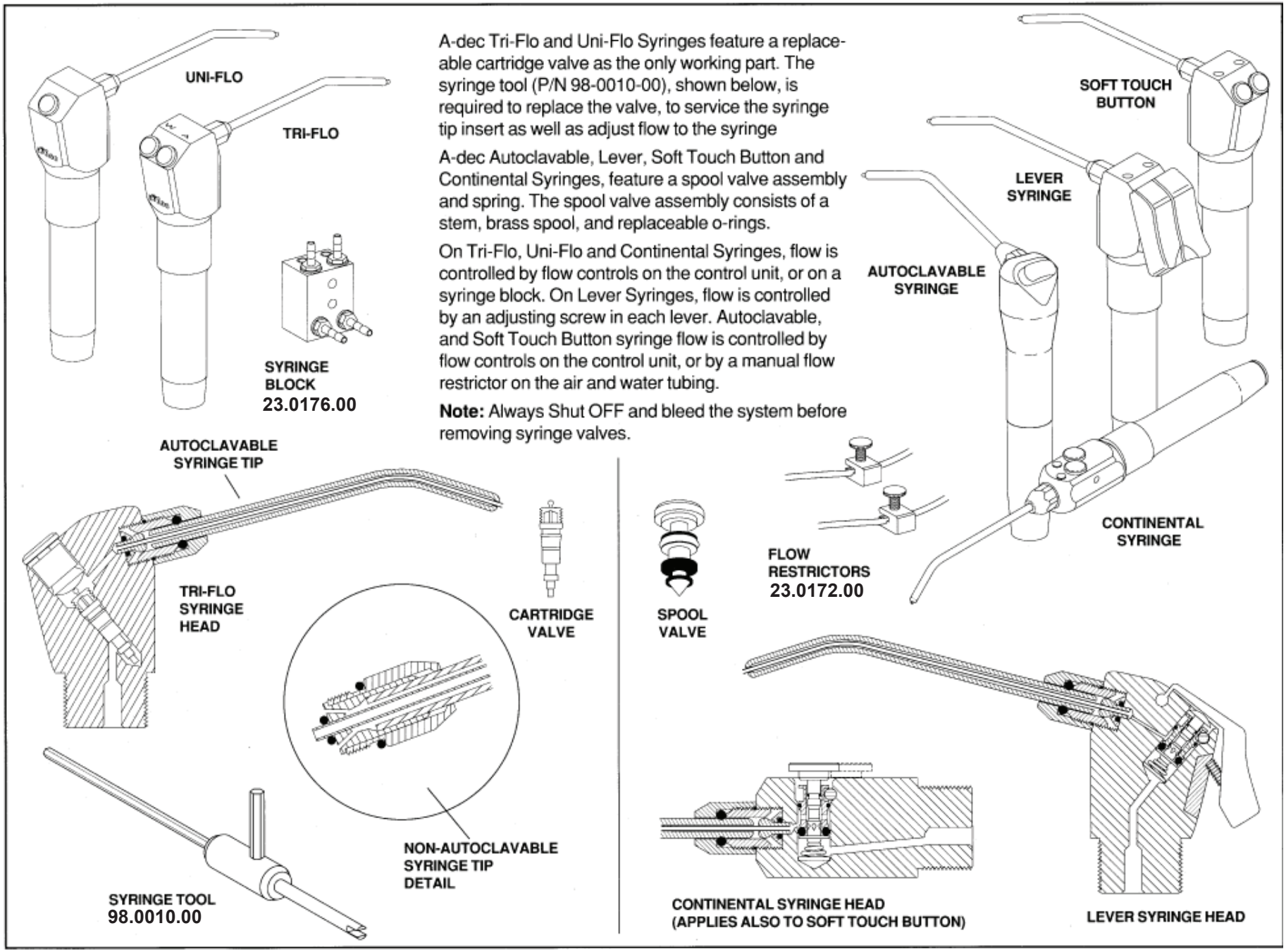
TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Water Shut-Off Valve does not completely shut off.	Defective O-ring seal on the end of the stem.	Disassemble the Water Shut-Off Valve and inspect the O-ring, stem, and seat for defects or debris.	If there are no defects or debris, check to see if the signal to the Water Shut-Off Valve shuts off fully.	Replace any defective parts. Reassemble and test the valve.

Water Shut-Off Valves

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Water Shut-Off Valve does not operate.	No water supply to the Water Shut-Off Valve.	Make sure the Manual Shut-Off Valve is fully opened.	If it is open, proceed with the next step.	If it is not open, turn the valve fully counterclockwise.
	No air signal to the Water Relay Valve.	Turn the Master On-Off valve OFF, then disconnect the air signal tube from the inlet on the Water Shut-Off Valve. Turn the Master On-Off Valve ON, and actuate the air signal to the Water Shut-Off Valve. Check for air flow from the disconnected tube.	If air is flowing from the tube, reconnect it and proceed with the next step.	If there is no air signal, trace backward through the system to Locate the obstruction.
	Obstruction in the system up-stream from the Water Shut-Off Valve.	Disconnect the Water Shut-Off Valve from the Master Shut-Off Valve. Open the valve slowly and check for water flow at the outlet.	If water comes from the outlet, make sure the strainer screen is not plugged (where applicable). Clean it, if necessary; if not, proceed with the next step.	If no water comes from the outlet, the Water Shut-Off Valve is okay. The obstruction is up-stream from the valve. Refer to the instructions for the Manual Shut-Off.
	Stuck stem or other internal obstruction.	Turn the Master On-Off Valve and the Manual Shut-Off Valve OFF, then remove the end plate from the Water Shut-Off Valve. Remove the U-cup, stem, and return spring. Carefully inspect all parts for defects or debris.	If all parts are clean and have no defects, reassemble and test the valve.	Replace any defective parts. Reassemble and test the valve.
Air bubbles in the water, causing sputtering and spurting.	Defective O-ring on the connector tube at the syringe terminal.	Refer to the instructions for the syringe and follow the procedure described there.		If air bubbles still appear in the water system, proceed with the next step.
	Leaking U-cup in the Water Shut-Off Valve.	Turn the Master On-Off Valve and the Manual Shut-Off Valve OFF, then remove the end plate from the Water Shut-Off Valve. Remove the U-cup and inspect for defects or debris.	If all parts are clean and have no defects, reassemble the valve and refer to the instructions for Pilot-Operated Regulators for the test procedure.	Replace any defective parts. Reassemble and test the valve.

Syringes


UNI-FLO
TRI-FLO
SYRINGE BLOCK
23.0176.00
A-dec Tri-Flo and Uni-Flo Syringes feature a replaceable cartridge valve as the only working part. The syringe tool (P/N 98-0010-00), shown below, is required to replace the valve, to service the syringe tip insert as well as adjust flow to the syringe
A-dec Autoclavable, Lever, Soft Touch Button and Continental Syringes, feature a spool valve assembly and spring. The spool valve assembly consists of a stem, brass spool, and replaceable o-rings.
On Tri-Flo, Uni-Flo and Continental Syringes, flow is controlled by flow controls on the control unit, or on a syringe block. On Lever Syringes, flow is controlled by an adjusting screw in each lever. Autoclavable, and Soft Touch Button syringe flow is controlled by flow controls on the control unit, or by a manual flow restrictor on the air and water tubing.
Note: Always Shut OFF and bleed the system before removing syringe valves.
SOFT TOUCH BUTTON
LEVER SYRINGE
AUTOCLAVABLE SYRINGE
CONTINENTAL SYRINGE
FLOW RESTRICTORS
23.0172.00
AUTOCLAVABLE SYRINGE TIP
TRI-FLO SYRINGE HEAD
CARTRIDGE VALVE
SPOOL VALVE
NON-AUTOCLAVABLE SYRINGE TIP DETAIL
SYRINGE TOOL
98.0010.00
CONTINENTAL SYRINGE HEAD
(APPLIES ALSO TO SOFT TOUCH BUTTON)
LEVER SYRINGE HEAD

Syringes

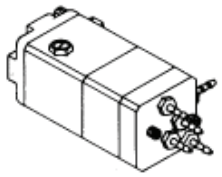
TROUBLESHOOTING GUIDE				
SYMPTOM	**POSSIBLE CAUSE**	**TEST PROCEDURE**	**CORRECTIVE ACTION**	
			IF TEST IS NORMAL	**IF TEST IS ABNORMAL**
Leakage around the Syringe tip.	Defective o-ring in or behind the tip nut.	Remove the tip and nut, and inspect both o-rings for damage or deterioration. Replace any defective parts.	If leaking stops, no further action is required.	If leaking persists, make sure the o-rings are the correct size, and check the tightness of the nut.
Leakage around the button.	Defective diaphragm on the button (Tri-Flo Syringes only).	Gently pry the button out of the Syringe body. Install a new diaphragm.	If leaking stops, no further action is required.	If leaking persists, check for damage in the bore.
	Defective o-rings on the button. (Lever, Soft Touch Button and Continental Syringes only).	Use a pointed instrument to push the button retainer pin out of the syringe body, then gently pry the button out of the syringe body and replace the o-rings.	If leaking stops, no further action is required.	If leaking persists, check for damage to the bore.
Loose tip.	Missing o-ring.	Check first to make sure the tip nut is tight. If so, remove the nut and check for a missing or defective o-ring.	If replacing the o-ring corrects the problem, no further action is required.	If the tip cannot be tightened, look for a defective nut, tip, or body.
Syringe does not shut all the way off.	Defective valve core (Tri-Flo Syringes only).	Turn the Master On-Off Valve OFF, then remove the button and valve core. Install a new valve core, reassemble and test the Syringe.	If the leaking stops, no further action is required.	If the syringe still does not shut off, make sure the valve core is screwed all the way into the body.
	Defective button o-rings (Lever, Soft Touch Button and Continental Syringes only).	Turn the Master On-Off Valve OFF, then use a pointed instrument to push the button retainer pin out of the syringe body. Remove the button and inspect the button o-rings. Replace any defective o-rings, reassemble, and test the syringe.	If the leaking stops, no further action is required.	If the syringe still does not shut off, replace the button spring.
Insufficient flow of air or water from the Syringe.	Insufficient flow through the Manual Shut-Off Valve and Filter to the system.	Refer to the instructions for the Manual Shut-Off Valve and Filter for the test procedures.	If the tests indicate that the system is getting an adequate flow, proceed with the next step.	Follow the instructions given with the test procedure.
	Improper adjustment of the screws on the Syringe Block (Tri-Flo, Uni-Flo or Soft Touch Button syringes only).	Turn the adjusting screw counter-clockwise to increase the flow to the syringe.	If the syringe works properly, no further action is required.	If the flow remains inadequate, proceed with the next step.
	Improper adjustment of the adjustment screws on either lever (Lever syringe only).	Turn the adjusting screw counter-clockwise to increase flow to the syringe.	If the syringe works properly, no further action is required.	If the flow remains inadequate, proceed with the next step.

Syringes

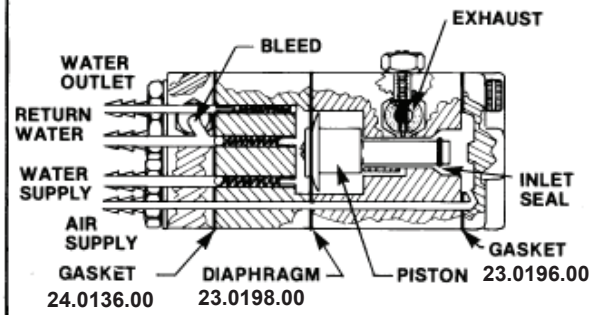
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Clogged syringe tip.	Exchange tips, and re-check the flow.	If the syringe works properly, blow air backward through the syringe tip to dislodge the obstruction.	If the flow remains inadequate, proceed with the next step.
	Clogged valve core (Tri-Flo Syringes only).	Turn the Master On-Off Valve OFF, then remove the syringe button and valve core. Clean or replace it. Reassemble and test the syringe.	Adjust the screw on the Syringe Block as necessary to achieve the desired flow.	If there is still insufficient flow, look for kinks in the tubing or obstructions in the barbs, terminal, or Syringe Block.
Air bubbles in the water, causing sputtering and spurting.	Defective o-rings on the connector tubes at the syringe head.	Use hemostats or a similar tool to clamp the syringe tubing below the syringe handle. Re-test the water flow from a handpiece or other water outlet.	If no air bubbles are noted, unscrew the syringe handle and replace the connector tube o-rings.	If air bubbles still appear in the water system, refer to the instructions for Pilot-Operated Regulators.

NOTES

Recirculator



RECIRCULATOR 23.0184.00 AND MANIFOLD 23.0186.00



The recirculator is an air-powered water pump designed to provide a continuous circulation of warm water through the Tri-Flo III syringe and water heater. Page D-2 shows how the recirculator is connected into the system. The recirculator requires air and water supplies precisely regulated to 80 psi and 40 psi respectively.

The pumping action is generated by a reciprocating movement of the piston and diaphragm (refer to the cross-section drawing). The following is a step by step explanation of how the reciprocating action is developed: (1) Regulated air flows into the recirculator, past the inlet seal, and into the chamber behind the diaphragm. (2) This deflects the diaphragm, forcing water out of the chamber on the other side of the diaphragm. The check valves in the water ports ensure that the water can exit only through the outlet. (3) As the diaphragm deflects, it draws the piston with it until the inlet seal is closed, stopping the flow of air into the recirculator. (4) The air in the chamber behind the diaphragm exits through the exhaust port. When the air pressure drops below the water pressure, the diaphragm and piston begin moving the other direction. (5) This allows water into the recirculator through either the return water or regulated water inlet, whichever is at a higher pressure. As long as the syringe is not being used, the return water will be at a greater pressure than the regulated water, so only the heated return water will be recirculated. When the syringe is in use, the return water pressure drops below the regulated water pressure, so "new" water enters the recirculator. (6) As the diaphragm and piston move back to their original positions, the inlet seal opens, and the cycle begins again.

There are no service adjustments on the recirculator. The exhaust needle valve is preset at the factory and sealed to prevent any changing of the setting. When removing the recirculator for repair or replacement it is not necessary to disconnect any of the tubing. Simply separate the manifold from the recirculator and leave the manifold and tubing in place.

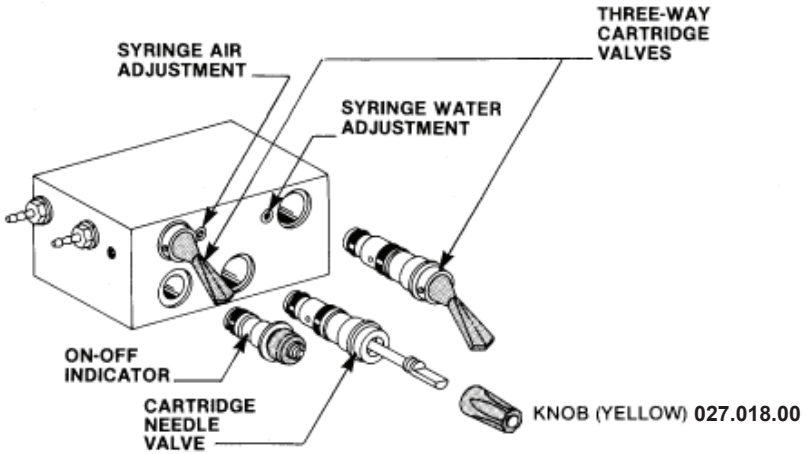
TROUBLESHOOTING GUIDE

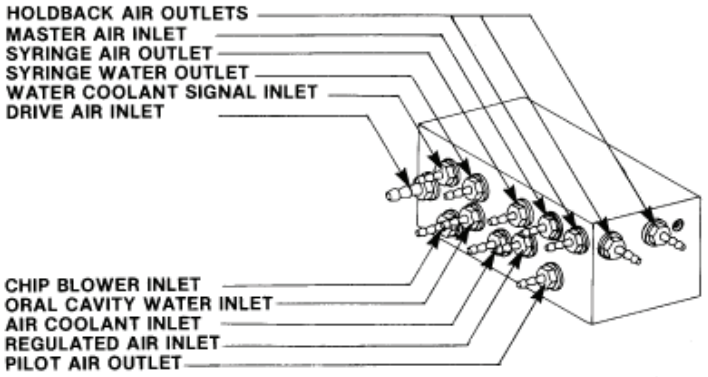
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Recirculator does not operate.	Recirculator is improperly positioned in the Utility Center.	The Recirculator must be positioned with the adjusting screw facing upward, as shown in the illustration. (Note: The adjusting screw is preset and sealed at the factory. Do not attempt to adjust it.)	If the Recirculator is properly positioned, proceed with the next step.	If it is incorrectly installed, reposition the Recirculator so the adjusting screw is on top.
	Improper setting of air or water pressure.	Check the gauges in the Utility Center. The optimum pressures are 80 psi for the air and 40 psi for the water. Adjust the pressure as necessary, following the instructions given for the Pre-regulators. If the supply pressures to the Utility Center are lower than the optimum system pressures given above, adjust the Pre-regulators so that the air pressure is exactly twice the water pressure. (Note: If the unit is equipped with an Air and Water Filter Regulator Pac (Part no. 24-0114-00) with only a single Pre-Regulator, it may be impossible to achieve the proper pressure ratio. Install a second Pre-regulator available in kit form, Part no. 90-0200-00).	If the pressures are correct, proceed with the next step.	If the pressures are too high, and cannot be adjusted, refer to the instructions for the Pre-regulators.

Recirculator

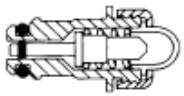
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Air bubble in the water side of the Recirculator.	Bleed the Recirculator as follows: (1) Turn the Master On-Off Valve ON; (2) Press the water button on the syringe and hold it until the water runs in a steady stream; (3) Open the bleed valve and allow the water to run until it flows in a steady stream; (4) Turn the Master On-Off Valve OFF, and bleed air and water pressure from the system by pressing the syringe buttons; (5) Turn the Master On-Off Valve ON. A steady pulsing of the outlet tube indicates that the Recirculator is pumping.	If the Recirculator starts pumping, no further action is required.	If the Recirculator fails to start, or starts then stops, repeat the bleeding procedure. If it still does not work properly, proceed with the next step.
	Air leaking into the water system.	If repeated bleeding of the Recirculator fails to eliminate all the air bubbles from the water, there is a leak in the system allowing air to seep into the water. With a hemostat, clamp off the air tube going into the Recirculator, then bleed the Recirculator. If air continues getting into the water, refer to the instructions for the Pilot-Operated Regulator and the Century Pac to correct possible leakage there. However, if the air stops getting into the water while the air tube is clamped off, the leak is in the Recirculator. Try tightening the screws that hold the manifold in place. If that fails, remove the manifold and tighten the screws that hold the check valve assembly to the Recirculator body. Inspect the manifold gasket and sealing surfaces. When assembling the Recirculator, be certain that all the holes in the gasket and manifold line up with those in the body. Continued leakage indicates a defective or improperly seated diaphragm.	If there is no indication of air leaking into the water, proceed with the next step.	To inspect the diaphragm, remove the manifold and check valve assembly. The diaphragm and stem can be removed by gently pulling on the diaphragm. Replace any defective parts. When assembling the Recirculator be careful to position the check valve assembly gasket and manifold properly so no passages are blocked.
	Gassy water system.	Some community water systems may contain higher than normal concentrations of dissolved gasses. These may "settle out" over a weekend or over night. Daily bleeding of the Recirculator may solve the problem.	Where this situation exists, make bleeding of the Recirculator a part of the daily routine.	In extreme cases, it may be desirable to convert to a "drip" type circulating syringe that has no Recirculator.
	Stuck or plugged check valves.	Remove the manifold and check valve assembly. Use a piece of stiff wire (i.e. a paper clip) to press the check valves. Carefully examine the check valves for any debris. Replace the check valve assembly if it cannot be thoroughly cleaned. Re-assemble the Recirculator and bleed the air from it, then test the unit.	If the Recirculator now functions properly, no further action is required.	If this does not correct the problem, disassemble the Recirculator and check for a stuck stem in the main body.

Century II Master Block Assembly

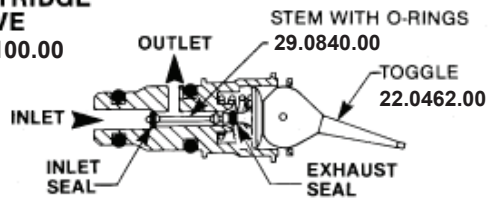




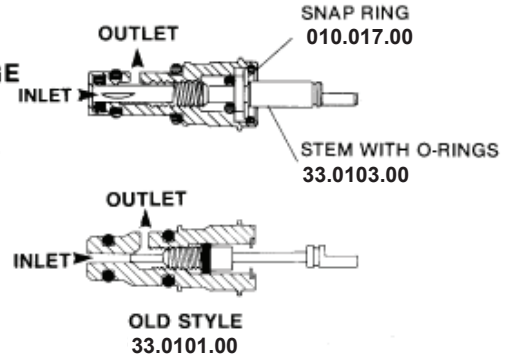
ON-OFF INDICATOR
24.0105.00



3-WAY CARTRIDGE VALVE
33.0100.00



CARTRIDGE NEEDLE VALVE
33.0101.00



Description

The A-dec Century II Master Block houses the Master On-Off Valve, the On-Off Indicator, the Air Coolant Flow Control, the Water Coolant On-Off Valve, and the Syringe Flow Controls. All the working components are accessible from the front of the unit and are of "cartridge" design, so they can be serviced without disconnecting any tubing.

The Master On-Off and Water Coolant On-Off Valves are identical cartridge type three-way valves (33-0100-00), and the Air Coolant Flow Control is a cartridge type needle valve (33-0101-00). While it is normally more economical to replace these Cartridge Valves than it is to repair them, instructions for repairing them are included here and may be used if a replacement valve is not readily available.

Cartridge Valve Replacement

1. The Cartridge Valves and On-Off Indicator are flanged so they cannot be removed as long as the faceplate is in front of the Master Block. Pull the knobs off the Air and Water Coolant Flow Controls.
   a. On Century II carts and panel-mount Mini-Trols, remove the two screws that secure the Master Block to the faceplate. Move the Century II assembly back to get access to the Cartridge Valves.
   b. On arm-mounting Century II Mini-Trols, remove the faceplate from the control housing, leaving the Century II assembly in place.
2. Turn OFF the air supply at the Manual Shut-Off Valve and bleed all pressure from the system.

> **WARNING**
> Before loosening the Cartridge Valve or On-Off Indicator set screws, turn the air supply OFF and bleed all pressure from the system. If this is not done, the valve or indicator may be ejected from the Master Block.

3. Loosen the set screw that secures the valve in the Master Block. The set screw for the Master On-Off Valve is on the end of the Master Block. The other set screws are on the bottom of the Master Block.

Century II Master Block Assembly

4. Pull the Cartridge Valve or On-Off Indicator out of the Master Block. If the valve cannot be pulled out by hand, use pliers on the toggle or stem. A stuck On-Off Indicator can be pried loose with a screwdriver under the bezel. Using air pressure to pop the components out is **not recommended.**

5. Before installing the replacement valve, lightly coat the O-rings with silicone grease. Push the valve in until it is fully seated. On toggle valves, be sure that the ON and OFF positions are properly oriented. **Firmly tighten the set screw.**

6. On carts and panel-mount Mini-Trols, reinstall the Century II assembly on the faceplate. On arm-mounting Mini-Trols, reinstall the faceplate on the front of the unit.

7. Turn ON the air supply at the Manual Shut-Off Valve, and test the unit. **Do not turn the air ON unless you are sure the Cartridge Valve and On-Off Indicator set screws are tight.**

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
The unit does not come on when the Master On-Off Valve is turned ON. (The On-Off Indicator shows OFF.)	No air pressure at the inlet to the Master On-Off Valve.	Verify first that the compressor is turned on and that the Manual Shut-Off Valve is fully open. If so, turn the Master On-Off Valve ON and OFF while listening for a "puff" of air from around the toggle each time you turn the valve OFF.	If a "puff" can be heard, the outlet is plugged, either in the Cartridge Valve body or the Master Block. Remove the Master On-Off Valve and clean the passages.	If no air is heard, check for a clogged filter. If the filter is okay, check for a pinched master air tube (yellow with solid red tracer) between the Filter-Regulator and the Master Block. Check also for an obstructed barb on the Master Block.
The unit does not work when it is turned ON. (The On-Off Indicator shows ON.)	No pressure at the Air Regulator outlet.	Check the system air pressure gauge. The gauge should indicate 80 psi.	If the system pressure is adequate, there is an obstruction between the Regulator and the Foot Control. Check for crimped tubing or plugged barbs.	If there is little or no pressure indicated on the gauge, refer to the instructions for Pilot-Operated Regulators and Pre-Regulators.
The unit stays ON when the Master On-Off Valve is turned OFF.	The exhaust seal O-ring in the Master On-Off Valve is installed in the wrong groove on the stem.	Remove and disassemble the Cartridge Valve.* Of the two closely spaced grooves near the head of the stem, the exhaust seal O-ring belongs in the one closer to the head. The other groove should be empty.	If the O-ring is correctly installed, look for debris in the exhaust seal area. Re-assemble and test the unit.	If the O-ring is in the wrong groove, remove it and install a new one in the correct groove. Re-assemble and test the unit.

*Observe the WARNING given in the Cartridge Valve replacement procedure.

Century II Master Block Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Air or water leaks from around the syringe flow controls.	Defective O-ring seal on the stem.	Turn the Master On-Off Valve OFF, and bleed the system pressure, remove the flow control stem. Inspect the O-ring and bore for defects.	If no defects are found, clean all parts. Lubricate the O-ring. Reassemble and test the unit.	Replace any defective parts. Clean the bore and stem, and lubricate the O-ring. Re-assemble and test the unit.
Air leakage from a Cartridge Toggle Valve that is turned ON.	Defective exhaust seal in the Cartridge Valve.	Isolate the source of the leakage, using a soap solution if necessary. When testing for leakage from the Water Coolant On-Off Valve, the Foot Control must be depressed. Leakage around the toggle confirms that the exhaust seal is defective.	If there is no leakage around the toggle, proceed with the next step.	If the leakage is around the toggle, remove and disassemble the Cartridge Valve.* Inspect the ex-haust seal area. Replace any defec-tive parts. Reassemble and test the unit.
	Defective O-ring seal around the Cartridge Valve.	If the leakage is around the perimeter of the valve, the O-ring around the center of the Cartridge valve is not sealing.	If there is no leakage here or around the toggle check for leakage from nearby components or barbs on the Master Block.	If the leakage is around the perimeter, remove the Cartridge Valve.* Inspect the O-ring, its seat, and bore. Replace any defective parts. Reassemble and test the valve.
Air leakage from a Cartridge Toggle Valve that is turned OFF.	Defective inlet seal or defective O-ring seal around the Cartridge Valve.	Remove the Cartridge Valve* from the Master Block, and inspect the O-ring around the rear of the valve, the O-ring seat, and the bore in the Master Block.	If there are no apparent defects in these areas, disassemble the valve and inspect the inlet seal area.	Replace any defective parts. Reassemble and test the unit.
Air leakage from around the stem of the Cartridge Needle Valve.	Defective O-ring at the front of the Needle Valve stem, or defective O-ring seal around the Cartridge Valve.	Remove the Cartridge Valve* from the Master Block, and inspect the O-ring around the rear of the valve, the O-ring seat, and the bore in the Master Block.	If there are no ap-parent defects in these areas, disassemble the valve and inspect the front seal area.	Replace any defective parts. Reassemble and test the unit.

*Observe the WARNING given in the Cartridge Valve replacement procedure.

Century II Master Block Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Coolant air leaks constantly from any of the handpieces.	Defective O-ring seal at the inlet of the Cartridge Needle Valve.	Remove the Cartridge Valve* from the Master Block, disassemble the valve and inspect the inlet seal area.	If no defects are found clean all parts. Lubricate the O-ring. Re-assemble and test the unit.	Replace any defective parts. Clean the bore O-ring. Re-assemble and test the unit.
No air coolant from any of the handpieces (water coolant works properly).	The Air Coolant Flow Control is closed.	Turn the Air Coolant Flow Control counter-clockwise while running a handpiece.	If the air coolant starts flowing, adjust for the desired spray.	If the air coolant does not begin to flow by the time the knob is turned all the way counter-clockwise, proceed with the next step.
	Obstructed air passage in the Control block next to the Master Block.	Refer to the Century II Control Block instructions for the test procedure.	If the test indicates that the Control Blocks are okay, proceed with the next step.	Take corrective action as indicated in the Control Block instructions.
	The Air Coolant flow is not getting to the Master Block.	Remove the Air Coolant Flow Control Cartridge Needle Valve* from the Master Block. Turn the unit ON and step on the Foot Control. Check for a stream of air coming from the Needle Valve bore in the Master Block.	If there is a flow of air, proceed with the next step.	If there is no air, check for obstructions in the air coolant tube or the barb on the Master Block.
	Debris lodged in the Cartridge Needle Valve.	Disassemble the Air Coolant Needle Valve and clean any foreign material from the passages.	If nothing is in the Needle Valve, check the passage going to the Control Blocks.	Carefully clean all parts. Check the filter in the air supply. Re-assemble and test the unit.
No water coolant from any of the handpieces (air coolant works properly).	The signal air is not getting to the Master Block.	While stepping on the Foot Control, turn the Water Coolant On-Off Valve ON and OFF. Listen for air to exhaust around the toggle each time you turn the valve OFF.	If air exhausts from the valve each time it is cycled, proceed with the next step.	If no air exhausts from the valve, look for obstructions in the signal air tube or the barb on the Master Block.

*Observe the WARNING given in the Cartridge Valve replacement procedure.

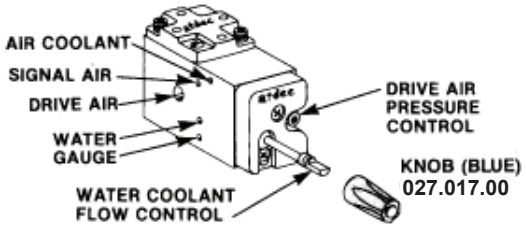
Century II Master Block Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	No water supply to the Master Block.	On units that have a syringe on the handpiece control, try spraying water from the syringe. On other units, turn the Master On-Off Valve OFF, then remove the plug from the syringe water outlet on the Master Block. Cover the outlet with a towel, then momentarily turn the unit ON and see if water comes out. If not, try turning the syringe water adjustment counter-clockwise.	If water is present, proceed with the next step.	If there is no water, check at the outlet of the water regulator. If there is water there, check for obstructions in the water tube or the inlet barb on the Master Block.
	Clogged water passage in the Master Block.	Turn the Master On-Off Valve OFF, then separate the Control Blocks from the Master Block. Momentarily turn the unit ON and see if water comes from the end of the Master Block.	If water comes from the Master Block, proceed with the next step.	If no water comes out, try running a small wire through the passage, to dislodge debris from the Master Block. When you get water to flow through the block, reassemble and test the unit.
	The signal air is not getting through the Master Block.	Continuing from the preceding step, clamp hemostats on the red tube (oral cavity water) and the orange tube with black dashes (drive air) where they go into the Master Block. Turn the Master On-Off Valve ON and step on the Foot Control. Turn the Water Coolant On-Off Valve ON and see if the signal air comes through the passage on the end of the Master Block.	If so, check for obstructed passages in the Control Block nearest to the Master Block.	If no signal air comes through the Master Block, remove the Water Coolant On-Off Valve* and check for obstructions in it and the Master Block.

*Observe the WARNING given in the Cartridge Valve replacement procedure.

NOTES

Century II Control Blocks



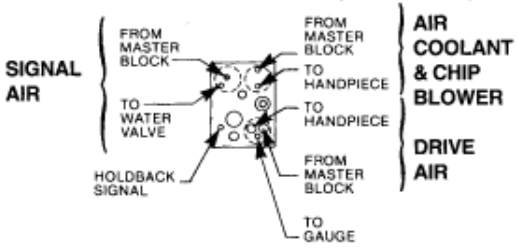
Description

The Century II Control Block is used in automatic and manual systems to control the routing of air and water coolant and drive air to the handpieces. The Control Blocks are used with the Century II Master Block and either a manual selector valve or automatic handpiece hangers, to make a complete control system (refer to pages B-1, B-2 and B-3). The Control Blocks are used with an IC Inlet Manifold and automatic handpiece hangers to make a complete control system (refer to page B-22).

Operating Principles

Each of the Century II Control Blocks has lateral passages for drive air, water coolant, air coolant/chip blower, and signal air. (Refer to the illustration above.) These passages line up with outlet passages in the end of the Master Block or IC Inlet Manifold.

CONTROL BLOCK DETAIL (FRONT VIEW)



In each block, the passages for the drive air, air coolant, and signal air intersect with passages that lead to the front surface of the block. Other passages lead to the handpiece drive air barb, the handpiece pressure gauge, the handpiece air coolant barb, and the cap for the water valve (refer to the **Control Block Detail** drawing). It is here, at the front surface of the block, that the air from the foot control is either held back or allowed to flow through and run the handpiece.

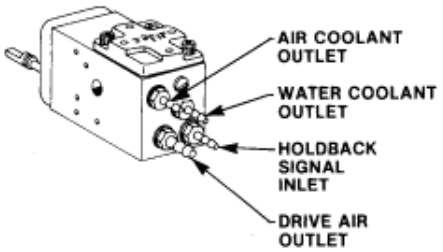
FRONT COVER DETAIL (INNER SURFACE)

The front cover of the Control Block has three cavities in the inner surface. As indicated by the broken lines on the Control Block Detail drawing, these cavities in the cover correspond in location to the three groups of passages in the front of the block. When the block is assembled,with the diaphragm in place between the block and the cover, the cavities allow the diaphragm to deflect away from the surface of the block, so air can flow between the grouped passages.

The flow between the grouped passages can occur only if the diaphragm is allowed to deflect into the cover. Air pressure from the handpiece hanger valve or the handpiece selector valve holds the diaphragm against the block. This prevents any flow between the passages, so the handpiece cannot operate.

In automatic control systems, placing a handpiece in its hanger actuates the hanger valve to supply the holdback signal that shuts off the Control Block. Lifting a handpiece out of its hanger releases the holdback signal allowing air to pass through the control block. In manual control systems, the manually-operated selector valve releases the holdback signal, allowing air to pass through the control block of the selected handpiece. **Note:** For Excellence Model 4300, see Section T-21A.

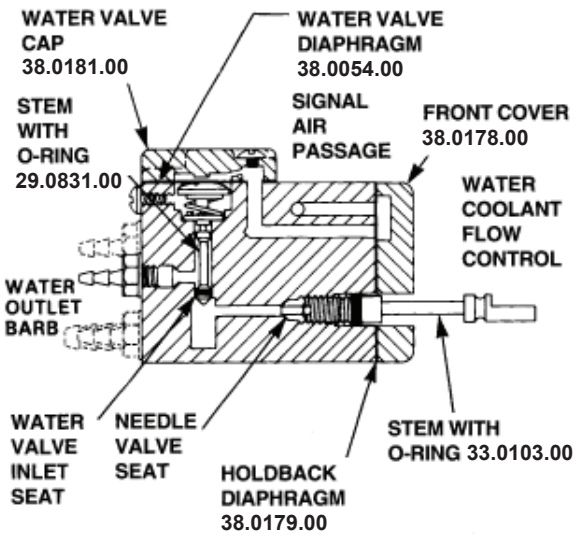
Water coolant for the handpiece is controlled by the water valve in a block. The water is supplied through



a passage from the Master Block or IC Inlet Manifold. This passage intersects with the Water Coolant Flow Control needle valve, as shown in the cross-section drawing. After passing the needle valve seat, the water flows to the inlet seal at the bottom of the water valve stem. Unless the water valve is actuated, the flow of water is blocked at this point.

Actuation of the water valve occurs when air pressure is applied above the water valve diaphragm in the water valve cap. The drawing below shows how the signal air reaches the water valve cap after passing the holdback diaphragm at the front of the Control Block. When the signal air reaches the

WATER VALVE CROSS SECTION



Century II Control Blocks

water valve cap, it deflects the diaphragm downward. This in turn pushes the stem downward and unseats the inlet seal, allowing water to flow through the valve to the outlet barb.

Releasing the signal air pressure allows the spring to push the stem and diaphragm back up, to close the valve. The movement of the stem and diaphragm creates a momentary low pressure at the water outlet barb as the valve closes. For Century II Control Blocks manufactured prior to February of 1986, this caused a small quantity of water to be drawn back into the valve. If water retraction is not desired, the non-retraction screw and washer can be removed from the rear of the block and an o-ring installed in the center groove of the valve stem (refer to the **Water Valve Stem Detail** drawing).

WATER VALVE STEM DETAIL

RETRACTING	NON-RETRACTING	NON-RETRACTING
29.0835.00	29.0830.00	29.0831.00 (CURRENT WATER VALVE STEM)

Note: Beginning in February of 1986, standard control blocks are configured at the factory as Non-Retracting.

"Dry" Control Blocks

Early Century II Controls (prior to 1981) were available with a "dry" block (P/N 38-0196-00) which did not have a water valve or passages for air or water coolant. These "dry" blocks had to be installed outboard from any "wet" blocks. Since April of 1981, any block may be converted to a "dry" block by removing the water coolant outlet barb, and installing a plug (P/N 021-016-00) in its place.

Adjustment

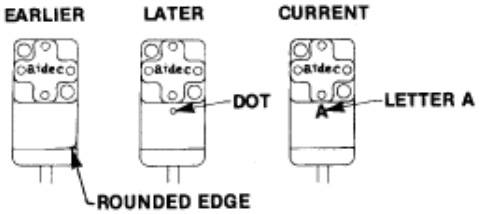
The Century II Control Block has two adjustments for the handpiece, to limit the maximum drive air pressure and to control the water coolant flow. Both adjustments are on the front of a block.

To adjust the drive air pressure, run the handpiece with the foot control fully depressed and, using a 3/32-inch hex key, adjust the pressure to the maximum specified by the handpiece manufacturer. For A-dec handpieces, the maximum recommended pressure is 32 psi.

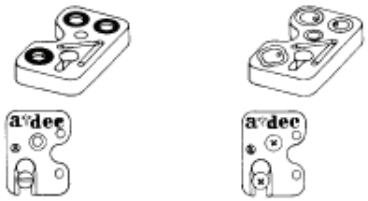
To adjust the water coolant flow, turn the knob clockwise to decrease flow or counter-clockwise to increase flow.

Service Notes

A small number of Control Blocks manufactured before May 21, 1979, were found to have a problem which might cause water to drip from the handpiece. Block dimensions were revised at that time to eliminate the problem. All revised blocks have been identified by either a machined corner, a machined dot, or an "A", as shown below. Blocks not having an identifying mark require a modified water cap identified by a small blue dot in the A-dec logo. These modified caps are to be used only on control blocks with no identifying marks.



Early blocks have front covers identified with the letter "A", which use o-rings for sealing. If there is an air leakage problem around the cap, current revision covers (identified as "B") should correct the problem. Otherwise, it is not necessary to replace existing "A" covers.



TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Audible air leakage from the Control Block area.	Loose connections.	Check for leakage with the handpieces in their hangers and the Foot Control depressed. If necessary, use a soap solution to find the leak. Tighten the tie bolt that secures the blocks together and the screws that secure the water cap and front cover to the block.	If no leakage is found on the Control Blocks, check the Master Block or IC Inlet Manifold and barb connections.	If tightening the fasteners fails to stop the leak, proceed with the next step.

Century II Control Blocks

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Defective gasket or diaphragm seal	For leakage between the blocks, replace the gaskets. For leakage between the block and the front cover, replace the holdback diaphragm. For leakage around the water valve cap, replace the water valve diaphragm.	If this stops the leakage, no further action is required.	If leakage continues, check for flaws in the sealing surfaces. Replace any defective parts.
Water leakage from the Control Block.	Loose connections.	Depending on the point of leakage, tighten the socket-head screws that secure the cap to the top of the block, or the tie bolts that hold the blocks together.	If this stops the leakage, no further action is required.	If tightening the fasteners fails to stop the leakage, proceed with the next step.
	Defective gasket or diaphragm seal.	For leakage between the blocks, replace the gaskets. For leakage around the water valve cap, replace the diaphragm.	If this stops the leakage, no further action is required.	If leakage continues, check for flaws in the sealing surfaces. Replace any defective parts.
Air bubbles in the coolant water.	Defective O-ring on the connector tube at the syringe terminal.	Refer to the instructions for the syringe and follow the procedure described there.		If air bubbles still appear in the water system, proceed with the next step.
	Defective water regulator (Control Blocks okay).	Refer to the instructions for the Pilot-Operated Regulator for the test procedure.	If testing indicates no problem in the Pilot-Operated Regulator, proceed with the next step.	Take corrective action as indicated in the Pilot-Operated Regulator instructions.
	Loose fasteners.	Tighten the screws that secure the water valve cap to the Control Block, and tighten the tie bolt that secures the blocks together.	If this corrects the problem, no further action is required.	If there is still air in the water, proceed with the next step.
	Cross-leakage under the water valve diaphragm.	Remove the cap from the top of the Control Block and carefully inspect the diaphragm and the surfaces of the block and cap.	If no defects are observed, install a new diaphragm. Reassemble and test the valve.	Replace any defective parts. Reassemble and test the unit.
Water drips continuously from the handpiece while the unit is ON, but not in use.	Improperly installed water valve cap.	Look at the top of the Control Block. The A-dec name should be right side up when viewed from the front of the unit.	If the cap is properly installed, proceed with the next step.	If it is on wrong, remove the cap and install it correctly. Re-test the unit.

Century II Control Blocks

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Water valve cap has no bleed hole, or the bleed hole in the cap is plugged.	Look at the top of the Control Block. A bleed screw should be located in the corner of the water valve cap, and should be unobstructed. NOTE: Only a very few, early Century II Blocks did not have bleed holes.	If the cap has an unobstructed bleed hole screw, proceed with the next step.	If the cap does not have a bleed hole, replace the water valve cap (refer to the introductory section of T-20). If the bleed hole screw is obstructed, remove the obstruction.
	Water valve stem is stuck or has a defective return spring.	Turn the Master On-Off Valve OFF, then remove the cap and diaphragm from the Control Block. Press and release the water valve stem to check its freedom of movement.	If the stem seems to move freely, proceed with the next step.	If it sticks, remove the stem and inspect for debris or defects. Replace any defective parts. Reassemble and test the valve.
	Defective inlet seal in the water valve.	Remove the stem, and inspect the inlet seal O-ring.	If the O-ring is not defective, proceed with the next step.	Replace any defective parts. Reassemble and test the valve.
	Defective seat in the Control Block.	There is no test to verify this, except the elimination of other possibilities as explained in the preceding steps.		Replace the Control Block. Reassemble and test the unit.
Water leaks from all the handpieces while one is in use.	The air supply pressure is too low, or water pressure is too high.	Check the air and water pressure gauges. The air pressure should be 80 psi, and the water pressure should be 40 psi.	If the pressures are correct, proceed with the next step.	If the pressures are incorrect, refer to the instructions for the Pre-Regulators, for the adjusting procedure.
Air or water leaks from a handpiece that is not in use, only when another handpiece is being used.	The holdback diaphragm is defective or improperly installed.	Turn the Master On-Off Valve OFF, then remove the front cover from the Control Block for the leaking handpiece. Check for defects in the diaphragm.	If the diaphragm is not defective, proceed with the next step.	If the diaphragm is defective, install a new one. Reassemble and test the unit.
	Defect in the front surface of the block.	Visually inspect the front surface of the block in the area of the air passages.	If no defects are visible, carefully reassemble the Control Block and test the unit.	If the surface is damaged, install a new Control Block. Reassemble and test the unit.

Century II Control Blocks

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Coolant sometimes sprays momentarily from the handpieces as they are lifted from their hangers.	The Foot Control Valve fails to exhaust when it is released.	Refer to the instructions for the Foot Control Valve for the test procedure.		Take corrective action as indicated in the Foot Control Valve instructions.
A steady flow of coolant sprays from the handpieces as soon as they are lifted from their hangers.	The Signal Relay Valve on the Foot Control does not shut off.	Refer to the instructions for the Signal Relay Valve for the test procedure.		Take corrective action as indicated in the Signal Relay Valve instructions.
Restricted flow of air or water.	Debris blocking internal passages.	Check first for pinched tubing or other restrictions outside the Century II Control System. If you isolate the problem to the control system, remove the barbs and check for debris there, before disassembling the Master Block or Control Blocks.	If no debris is found, re-assemble and test the unit.	Clean all debris from the barbs and passages. Make sure no tubes are crimped or pinched.
No air or water coolant from any of the handpieces.	Defective Signal Relay on the Foot Control.	Refer to the Signal Relay instructions and conduct the tests for "No signal from the Signal Relay Valve."	If the Signal Relay is okay, look for a pinched or plugged tube between the Signal Relay and the handpiece control system.	Take corrective action as indicated in the Signal Relay instructions.
No air coolant from any of the handpieces (water coolant works properly).	The Air Coolant Flow Control is closed.	Turn the Air Coolant Flow Control counter-clockwise while running a handpiece.	If the air coolant starts flowing, adjust for the desired spray.	If this does not start the air coolant flowing, proceed with the next step.

Century II Control Blocks

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Obstructed air passage in the Control block next to the Master Block or IC Inlet Manifold.	UNITS WITH A MASTER CONTROL BLOCK AND WITHOUT A CHIP BLOWER FOOT CONTROL: Remove the plug from the chip blower inlet on the Master Block. Step on the Foot Control. If air comes out, there is an obstruction at the joint between the Master Block and the first Control Block. If no air comes out, the Control Blocks are Okay. UNITS WITH A CHIP BLOWER FOOT CONTROL: Lift one of the hand-pieces, step on the Chip Blower button. If air comes from the hand-piece, the Control Blocks are okay. If no air comes out, there is an obstruction at the joint between the Master Block or IC Inlet Manifold and the first Control Block.	If the test indicates that the Control Blocks are okay, refer to the Century II Master Block instructions for further tests.	If the test indicates an obstruction at the joint between the Master Block and the Control Blocks, turn OFF the unit and remove the tie bolt. Use a wire to probe the passages to dislodge any debris. Re-assemble and test the unit.
	Foot control has not been connected to the Century II Control Block.	Inspect the brown tubing which goes from the Century II Control Block to the Air Coolant Valve for a plastic tee.	If the tee is present, refer to the Century II Hand-piece Control instructions for further tests.	Install a tee in the brown line. Connect the brown line from the foot control to the tee and test the unit.
No air coolant from one handpiece.	Clogged tube in the handpiece.	Switch the handpieces around and test each one, to determine whether the problem is in the handpiece or the Control Block.	If the Problem is in the handpiece, clean or re-place the air coolant tube.	If the problem is in the Control Block, proceed with the next step.
	Clogged passage in the Control Block.	Turn the Master On-Off Valve OFF, then remove the front cover and diaphragm from the Control Block. Remove the air coolant outlet barb from the back of the Control Block. Run a wire through the passage to dislodge any obstructions.	If no obstructions are found, check the handpiece tube and connector.	If there is debris in the Control Block passages, clean them out. Check the filter, then re-assemble and test the unit.
No water coolant from any of the handpieces (air coolant works properly).	Either the water supply or the signal air is not getting to Control Blocks.	Refer to the instructions for the Century II Master Block for the test to determine if the water supply and signal air are getting through the Master Block or the IC Inlet Manifold.	If tests confirm that water and signal air are getting to the Control Blocks, proceed with the next step.	Take corrective action as indicated in the Master Block instructions.
	Clogged passage in the Control Block nearest to the Master Block or IC Inlet Manifold.	If the water and signal air are getting to the Control Blocks, as confirmed by tests given in the Century II Master Block instructions, remove and disassemble the Control Block nearest to the Master Block or the IC Inlet Manifold.		Clean all internal passages. Inspect all parts, and replace any that are defective. Re-assemble and test the unit.

Century II Control Blocks

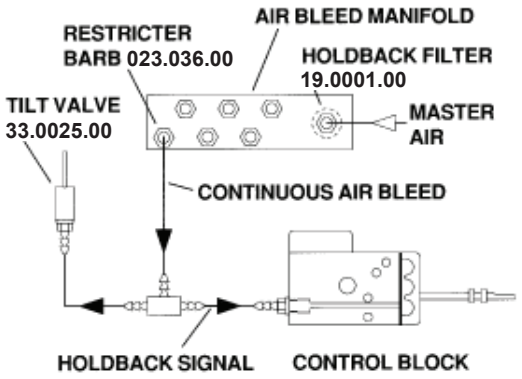
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No water coolant from **one** handpiece.	Closed needle valve.	Turn the Water Coolant Flow Control counter-clockwise, while running the handpiece.	If water coolant begins to flow, adjust the valve for the desired flow rate.	If there is no flow when the knob is turned fully counter-clockwise, proceed with the next step.
	Improperly installed water valve cap.	Look at the top of the Control Block. The A-dec name should be right side up when viewed from the front of the unit.	If the cap is properly installed, proceed with the next step.	If the cap is not properly installed, remove it and install it correctly. Re-test the unit.
	Leaking water valve diaphragm.	Remove the water valve cap and inspect the diaphragm for leaks.	If the diaphragm is not defective check for clogged passages or barbs in the Control Block.	If the diaphragm is defective, install a new one. Re-assemble and test the valve.
A handpiece that is in its hanger operates while another handpiece is being used.	Automatic systems only: The handpiece is not properly seated in its hanger.	Lift the handpiece, then place it back in its hanger, making sure it seats properly and moves the valve actuator.	If this corrects the problem, no further action is required.	If the problem persists, proceed with the next step.
	Automatic systems only: The Micro-Valve in the handpiece hanger does not open.	Refer to the instructions for the Three-Way Micro-Valve for the test procedure.	If the Micro-Valve works properly, check the holdback diaphragm as instructed below.	Take corrective action as indicated in the Three-Way Micro-Valve instructions.
	Manual systems only: The holdback signal from the Micro-Selector Valve or Rotary Selector Valve is weak or non-existent.	Refer to the instructions for the Micro-Selector Valve or Rotary Selector Valve for the test procedures.	If the Micro-Selector Valve or Rotary Selector Valve is okay, proceed with the next step.	Take corrective action as indicated in the Micro-Selector or Rotary Selector Valve instructions.

Century II Control Blocks

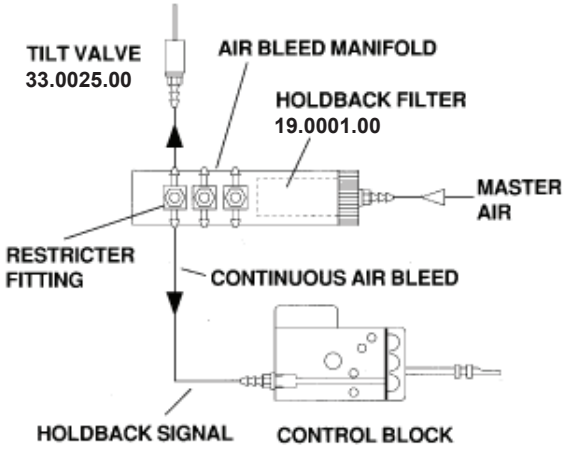
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Defective holdback diaphragm in the Control Block.	Turn the Master On-Off Valve OFF, then remove the front cover from the Control Block and check for defects in the diaphragm.	If there are no apparent defects in the diaphragm, carefully clean the parts, then re-assemble and test the unit.	If the diaphragm is defective, install a new one. Reassemble and test the unit.
One handpiece does not operate.	Automatic systems only: The handpiece hanger is set in the LOCKED OUT position.	Check the toggle on the handpiece hanger. It should be flipped **toward** the red dot.	If it is already set properly, proceed with the next step.	If it was set in the wrong position, flip it the other way and re-test the unit.
	Automatic systems only: The Micro-Selector Valve in the handpiece hanger is not working properly.	With the handpiece out of its hanger, disconnect the holdback signal tube from the outlet barb on the Micro-Valve.	If no air comes from the valve, and the handpiece still does not work, check for a crimp in the handpiece tubing.	If air flows from the valve, or if the handpiece now operates, refer to the instructions for the Three-Way Micro-Valve.
	Manual systems only: The Micro-Selector Valve or Rotary Selector Valve does not exhaust.	Refer to the instructions for the Micro-Selector Valve or Rotary Selector Valve for the test procedure.	If the Micro-Selector-Valve or the Rotary Selector Valve is working properly, check for a crimp in the handpiece tubing.	Take corrective action as indicated in the Micro-Selector Valve or Rotary Selector Valve instructions.

NOTES

Handpiece Holdback System (Excellence Model 4300)



ABOVE SHOWS AIR BLEED ASSEMBLY P/N 38-0312-00, REPLACED BY AIR BLEED ASSEMBLY SHOWN BELOW



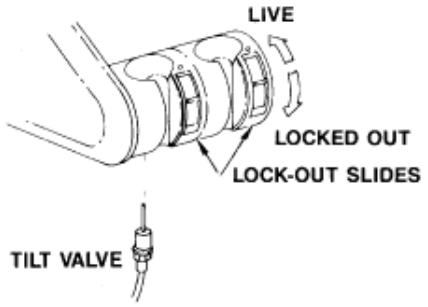
Description

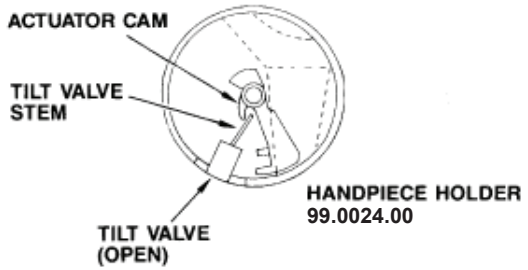
Both the master and control blocks on A-dec's Excellence Model 4300 handpiece control system are identical to A-dec's Century II Master Block (discussed in Section T-20) and Century II Control Block (discussed in Section T-21). The difference in the two control systems is the way holdback air is supplied to the control block.

In all A-dec control systems which use Century II components (except the Model 4300), placing a handpiece in its hanger actuates the hanger valve, creating the holdback signal which pressurizes the cavities in the cover and shuts off the control block. In the Model 4300, holdback air is continuous. It is applied to the control block through an air bleed manifold, and released through a valve in the handpiece holder when the handpiece is lifted. The holdback air bleeds through the valve until the handpiece is returned to the holder.

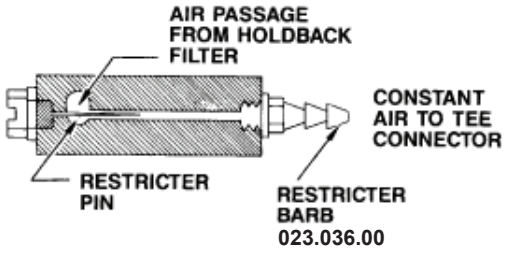
Operation

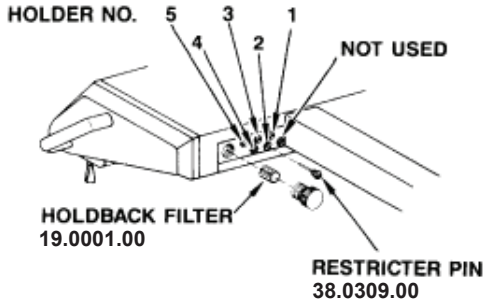
Schematics of the Model 4300 holdback systems are shown to the left. When the Master On-Off Toggle is flipped ON, master air is applied to the inlet of the air bleed manifold. Inside the manifold, the air passes through the holdback filter. This filter is much finer than the system air filter in the utility center to prevent clogging of orifices in the manifold.





SHOWS STATE OF TILT VALVE WITH HANDPIECE REMOVED FROM HOLDER





After passing through the holdback filter, the master air flow is to create a precisely controlled continuous air bleed. A tee connection in the air bleed line or restricter fitting routes this air to the holdback signal inlet on the control block, and to the valve in the handpiece holder.

When the handpiece is in its holder, the valve in the holder is closed. This allows the continuous air bleed to pressurize the holdback signal line, shutting off the control block. Lifting the handpiece from the holder opens the tilt valve releasing the holdback signal which allows air and water to pass through the control block to the handpiece.

Handpiece Holdback System (Excellence Model 4300)

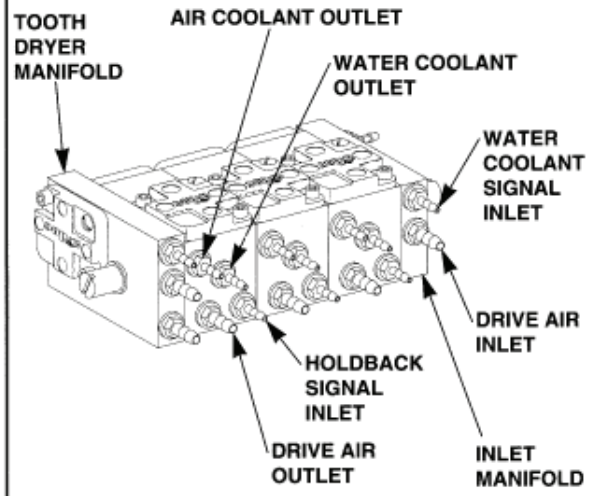
TROUBLESHOOTING GUIDE				
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
All handpieces run while in their holders.	Holdback filter clogged.	Remove and inspect the holdback filter. The filter can most easily be removed using the system's internal air pressure: Turn the system off, then remove the cap over the filter. Cup your hand over the filter opening, then turn the system back on momentarily to pop the filter out of its seat.	If the filter does not need to be replaced, check for loose connection or leakage between the holdback outlet of the master block and the filter inlet of the air bleed manifold.	If the filter is damp or discolored, replace it.
One handpiece runs while in its holder.	Handpiece is in the wrong holder.	Check to be sure the handpiece is placed in the correct holder.	If in the correct holder, proceed to the next step.	Place handpiece in the correct holder.
	Restricter pin dirty or installed incorrectly.	Remove and clean the restricter pin associated with the faulty handpiece.	If this solves the problem, no further action is required.	If the handpiece continues to run, proceed to the next step.
	Loose connection or leaky tubing.	Check for loose connections or leakage between the air bleed manifold, the control block, and the tilt valve. Use soapy water to detect slight seepage.	Repair leaks and loose connections.	If none can be found, proceed to next step.
	Defective tilt valve.	Use hemostats to clamp off the holdback tubing to the tilt valve.	If the handpiece stops running, replace the tilt valve.	If the handpiece continues to run, proceed to the next step.
	Restricter barb is clogged.	Pull the tilt valve out of the handpiece holder and manually tilt the system. Check for air flow around the tilt valve stem, using soapy water if necessary.	If there is no air flow, replace the restricter barb.	If there is air flow, proceed to the next step.
	Defective diaphragm on the control block, or defective holder.	Check for a defective holdback diaphragm in the control block. Refer to Section T-21.	Replace the diaphragm if necessary.	If the control block diaphragm is not defective, the actuator mechanism in the handpiece holder is defective. Replace the holder.
Handpiece does not run when out of its holder.	Lock-out slide in the inactive, or "locked-out" position.	Check to be sure that the lock-out slide is in the "live" position (towards the red dot).	Push the lock-out slide to the live position.	If the lock-out slide is correct and the handpiece still does not run, proceed to the next step.

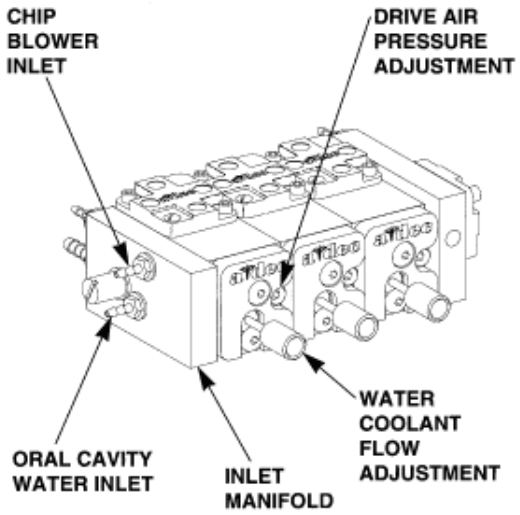
Handpiece Holdback System (Excellence Model 4300)

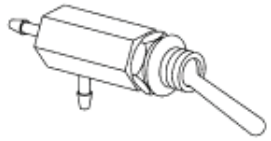
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Tilt valve not seated properly.	Pull the tilt valve out of the handpiece and manually tilt the stem.	If the handpiece now operates, reinstall the tilt valve, being sure to push it all the way in.	If the handpiece does not operate when the tilt valve is manually operated, proceed to the next step.
	Obstruction in the holdback line, or defective tilt valve.	Look for pinched tubing, plugged barb, or other obstruction between the tilt valve and the tee connection in the holdback signal air tube to the control block.	Clear any obstructions. Replace the restricter barb if necessary.	If no obstructions are found and the handpiece still does not operate, replace the tilt valve.
For system failure symptoms not listed here, refer to Section T-21.				

NOTES

Century II IC Handpiece Control Assembly







MASTER ON-OFF AND ARM BRAKE VALVE
026.123.00

TEE CHECK VALVE
27.0005.00

Description

The A-dec Century II IC Handpiece Control Assembly contains two to four Century II Control Blocks which are installed between an IC inlet manifold and a gauge or tooth dryer manifold.

Individual adjustments to Handpiece Drive Air Pressure and Water Coolant Flow Control are made through the side of the IC Control Head using the autoclavable control key provided or a 1/8 inch hex key.

The Master On-Off and Arm Brake valves are identical three-way toggle valves (026-123-00). The handpiece flush system has a Tee Check Valve (27-0005-00) plumbed to each Century II Control Block. It is more economical to replace these valves than to repair them.

TROUBLE SHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
The unit does not come on when the Master On-Off Valve is turned ON.	No air pressure at the inlet to the Master On-Off Valve.	First verify that the compressor is turned on and the Manual Shut-Off Valve is fully open. If so, turn the Master On-Off Valve ON and OFF while listening for a "puff" of air from around the toggle each time you turn the valve OFF.	If a "puff" can be heard, the Master Toggle valve outlet is plugged. Replace the Master On-Off Valve.	If no air is heard, check for a clogged filter. If the filter is okay, check for a pinched master air tube (yellow with solid red tracer) between the Filter Regulator and the Master On-Off Valve.

Century II IC Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
The unit does not work when it is turned ON.	No pressure at the Air Regulator outlet.	Check the system air pressure gauge. The gauge should indicate 80 psi.	If the system pressure is adequate, there is an obstruction between the Regulator and the Foot Control. Check for crimped tubing or plugged barbs.	If there is little or no pressure indicated on the gauge, refer to the instructions for Pilot-Operated Regulators and Pre-Regulators.
The unit stays ON when the Master On-Off Valve is turned OFF.	Plugged exhaust port in the Master On-Off Valve.	Turn the Master On-Off Valve ON and OFF while listening for a "puff" of air from around the toggle each time you turn the valve OFF.	Remove debris in the exhaust hole of the Master On-Off Valve. Reassemble and test the unit.	Replace the Master On-Off Valve. Re-assemble and test the unit.
No air coolant from any of the handpieces (water coolant works properly).	The Air Coolant Flow Control Valve is closed.	Turn the Air Coolant Flow Control Valve counter-clockwise while running a handpiece.	If the air coolant starts flowing, adjust for the desired spray.	If the air coolant does not begin to flow by the time the knob is turned all the way counter-clockwise, proceed with the next step.
	Obstructed air passage in the Control block next to the Inlet Manifold.	Refer to the Century II Control Block Instructions for the test procedure.	If the test indicates that the Control Blocks are okay, proceed with the next step.	Take corrective action as indicated in the Control Block instructions.
	The Air Coolant flow is not getting to the Inlet Manifold.	Remove the long dash green line from the Air Coolant Adjustment Valve. Turn the unit ON and step on the Foot Control. Check for a stream of air coming from the line.	If there is a flow of air, proceed with the next step.	If there is no air, check for obstructions in the air coolant tube coming from the Foot Control.
	Debris lodged in the Air Coolant Adjust-ment Valve.	Disassemble the Air Coolant Adjustment Valve and clean any foreign material from the passages.	If nothing is in the Air Coolant Adjustment Valve, check the passage going to the Control Blocks.	Carefully clean all parts. Check the filter in the air supply. Re-assemble and test the unit.

Century II IC Handpiece Control Assembly

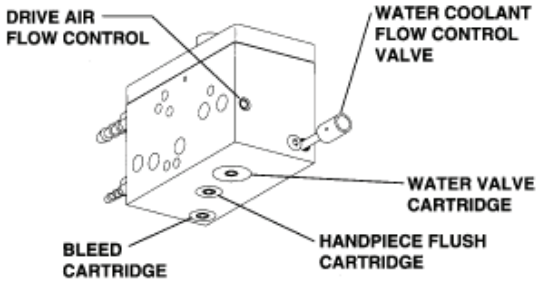
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No water coolant from any of the handpieces (air coolant works properly).	No pressure at the Water Regulator outlet.	Check the system water pressure gauge. The gauges should indicate 40 psi.	If the system pressure is adequate proceed with the next step.	If there is little or no pressure indicated on the gauge, refer to the instructions for Pilot-Operated Regulators and Pre-Regulators.
	The signal air is not getting to the Inlet Manifold.	Remove the short dash green line from the Inlet Manifold. Step on the Foot Control and listen for air exhausting from the line.	If air exhausts from the line, reinstall the line and proceed with the next step.	If no air exhaust from the line, look for obstructions in the signal air tube from the Foot Control.
	Signal air is not getting through the Inlet Manifold.	Turn the Master On-Off Valve OFF and bleed the system of air and water. Remove the Inlet Manifold from the Control Assembly. Clamp hemostats on the red tube (oral cavity water) and the orange tube with black dashes (drive air) where they go into the Inlet Manifold. Turn the Master On-Off Valve ON and step on the Foot Control and listen for signal air coming through the Inlet Manifold.	The Control Block nearest the Inlet Manifold is defective. Refer to the Century II Control Block instructions for test procedures.	Remove debris in the Inlet Manifold and retest the Inlet Manifold. If the signal air comes through the Inlet Manifold, reassemble the Control Assembly and test the unit.
	Oral cavity water is not getting to the Inlet Manifold.	Turn the Master On-Off Valve OFF and bleed the system of air and water. Remove the red tube (oral cavity water) from the Inlet Manifold. Direct the red tube into a container and briefly turn the Master On-Off Valve ON then OFF. Watch for water coming from the red tube.	Re-install the red tube to the Inlet Manifold and proceed with the next step.	If there is no water, there is an obstruction in the oral cavity water line. Try running a small wire through the line to dislodge debris. When water flows through the oral cavity water line, reassemble and test the unit.
	Oral cavity water is not getting through the Inlet Manifold.	Turn the Master On-Off Valve OFF and bleed the system of air and water. Remove the Inlet Manifold from the Control Assembly. Clamp a hemostat on the orange tube with black dashes (drive air) where it goes into the Inlet Manifold. Direct the Inlet Manifold into a container and briefly turn the Master On-Off Valve On the OFF. Watch for water coming from the Inlet Manifold.	The Control Block nearest the Inlet Manifold is defective. Refer to the Century II Control Block instructions for test procedures.	Remove debris in the Inlet Manifold and retest the Inlet Manifold. If the water comes through the Inlet Manifold, reassemble the Control Assembly and test the unit.

Century II IC Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No air coolant from a single handpiece.	Obstructed air passage in the Control Block.	Refer to the Century II Control Block Instructions for the test procedure.	Refer to the Century II Control Block Instructions for corrective action.	Refer to the Century II Control Block Instructions for corrective action.
	Plugged Handpiece tubing or terminal.	Remove the handpiece. Direct the handpiece nut into a container. Briefly step on the foot control. Watch for water coming from the handpiece nut.	If water comes from the handpiece nut, reinstall the handpiece and test the handpiece by stepping on the foot control. If no water coolant comes from the handpiece the handpiece is plugged. Refer to the handpiece manufacturers instructions.	If no water comes from the handpiece nut, try running a small wire through the passage to dislodge debris from the nut and tubing. When you get water to flow through the handpiece nut and tubing, replace and test the handpiece.
	Bad Tee Check Valve.	Remove the handpiece tubing from the tee check valve. Direct the barb on the tee check valve into a container. Briefly step on the foot control. Watch for water coming from the tee check valve.	If water comes from the tee check valve, reinstall the handpiece tubing and test the unit.	If no water comes from the tee check valve it is defective and must be replaced.

NOTES

Century Plus Control Blocks



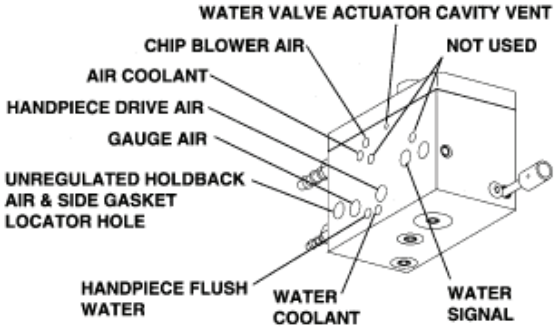
Description

A-dec's Century Plus handpiece control blocks are used in automatic systems to control the routing of coolants (air and water) and drive air to the handpieces and scalers

To facilitate on-site service, each Century Plus control block includes three cartridges (water valve, handpiece flush, and air bleed). These cartridges are easily accessed from the underside of the dental unit. This allows you to easily replace parts without removing covers or the control block assembly from the dental unit.

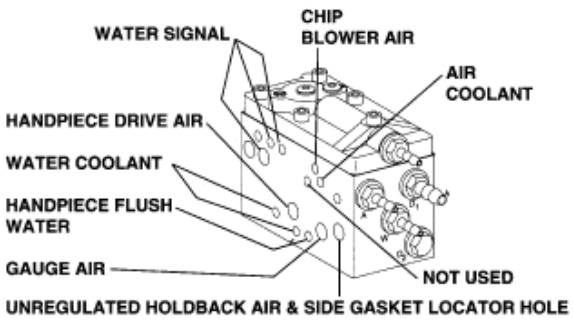
A Century Plus handpiece control block system consists of a Distribution Manifold, two to four Century Plus control blocks, and an End Cap. Optionally, the End Cap may be replaced by a Tooth Dryer control block

Operating Principles



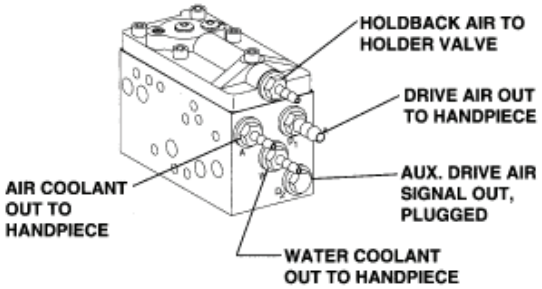
CONTROL BLOCK PASSAGES

* Patent Pending



CONTROL BLOCK PASSAGES

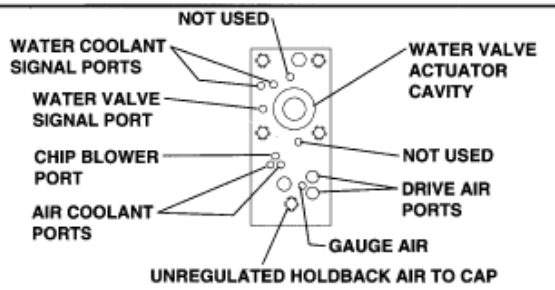
Each Century Plus Control Block has passages that line up with the outlet passages of the Distribution Manifold. These passages also line up from one control block to the next in a handpiece control system.


HOLDBACK AIR TO HOLDER VALVE
DRIVE AIR OUT TO HANDPIECE
AUX. DRIVE AIR SIGNAL OUT, PLUGGED
AIR COOLANT OUT TO HANDPIECE
WATER COOLANT OUT TO HANDPIECE

CONTROL BLOCK OUTLET BARBS

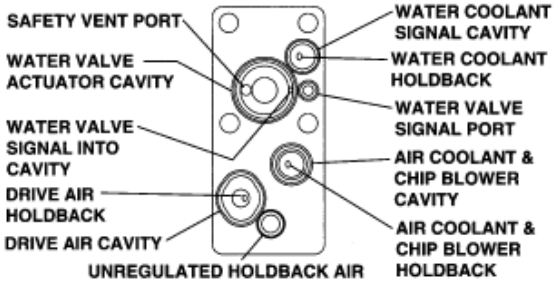
Within a control block, the passages for the Drive Air, Air Coolant, and signal air intersect with passages that lead to the top surface of the block. Other passages lead to the handpiece Drive Air, Air Coolant, Water Coolant, and Auxiliary Drive Air Signal outlet barbs.

At the top surface of the block, air is either held back or allowed to flow through to the handpiece by a diaphragm that is pressed down, by air pressure, over the passage ports.



CONTROL BLOCK PASSAGE PORTS

The top cap of the Control Block has cavities that correspond in location to the groups of passages drilled in the top of the block. When the block is assembled, with the diaphragm in place between the block and the cap, the cavities allow the diaphragm to deflect away from the surface of the block, so air can flow between the grouped passages.


SAFETY VENT PORT
WATER COOLANT SIGNAL CAVITY
WATER VALVE ACTUATOR CAVITY
WATER COOLANT HOLDBACK
WATER VALVE SIGNAL PORT
WATER VALVE SIGNAL INTO CAVITY
AIR COOLANT & CHIP BLOWER CAVITY
DRIVE AIR HOLDBACK
DRIVE AIR CAVITY
AIR COOLANT & CHIP BLOWER HOLDBACK
UNREGULATED HOLDBACK AIR

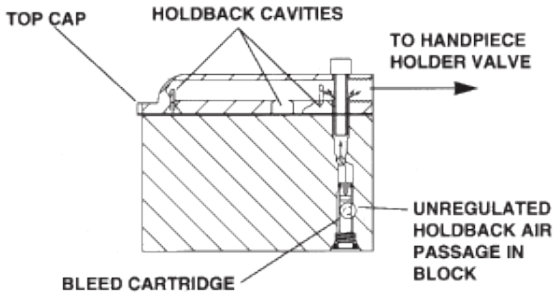
TOP CAP PASSAGE PORTS

The flow between the grouped passages can occur only if the diaphragm is allowed to deflect into the cavities in the cap. Air pressure from the handpiece hanger valve applied into the cavities presses and holds the diaphragm against the block. This blocks any flow between the passages preventing the handpiece from operating.

Century Plus Control Blocks

Handpiece Holdback System

In the Century Plus control system, the holdback signal air is continuous. When the Master On/Off toggle is flipped to the ON position, Master Air is applied to the Unregulated Holdback Air signal inlet of the Distribution Manifold. The manifold routes the holdback signal to the control block holdback bleed circuits.



HANDPIECE HOLDBACK BLEED

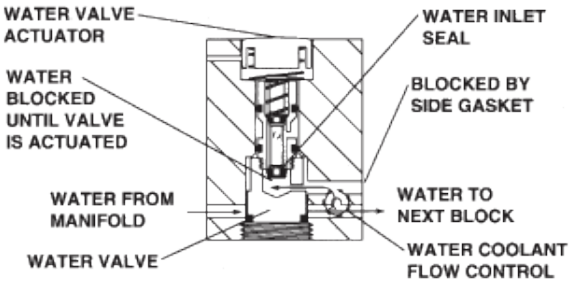
In each control block, the holdback signal is applied to three cavities in the top cap and the handpiece holder valve through a small hole in the Bleed Cartridge of each block. An outlet on the rear of the top cap routes this air to the valve in the handpiece holder.

While a handpiece is in its holder, the holder valve remains closed. The closed holder valve prevents the holdback signal air pressure in the top cap from bleeding off, pressurizing the cavities in the top cap. Holdback signal air pressure pushes the diaphragm down onto the top surface of the control block preventing air flow between grouped ports and disabling the control block.

While a handpiece is not in its holder, the holdback signal air is exhausted out the handpiece holder valve at a faster rate than can pass through the control block bleed cartridge. As a result, the holdback air pressure in the cap goes to zero and remains there enabling the control block.

Water Coolant Valve

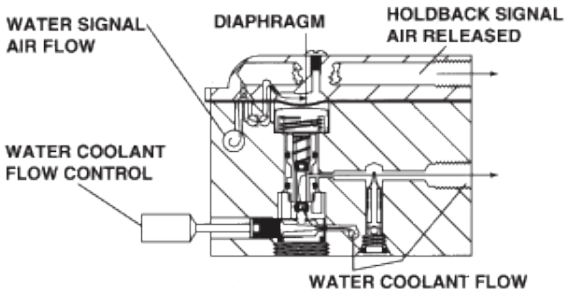
Water coolant for the handpiece is controlled by an integral water valve in the block. Water is supplied through a passage from the Distribution Manifold. This passage, as it passes through each block, intersects with the Water Coolant Flow Control needle valve bore. Water flows past the needle valve seat to the inlet seal at the bottom of the water valve stem. Until the water valve is actuated, the flow of water is blocked at this point.



WATER VALVE, END VIEW

Actuation of the water valve occurs when water signal air pressure is applied to the cavity above the water valve diaphragm, the diaphragm presses down on the water valve actuator which in turn opens the water valve allowing water to flow past the water inlet seal to the outlet barb

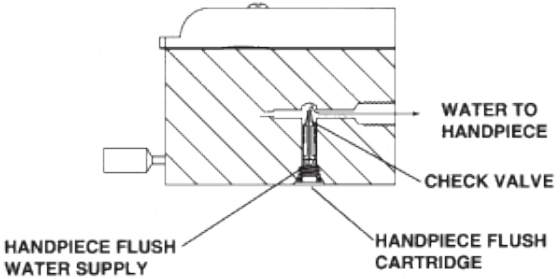
Releasing the signal air pressure allows the spring in the water valve to push the stem and diaphragm up, closing the valve.



WATER VALVE, SIDE VIEW

Handpiece Flush Water Flow

Flush water for the handpieces flows through a "duckbill" check valve in each block when the flush toggle valve is opened. The check valve blocks Water Coolant from entering the flush water passage. Water is supplied through this passage from the Distribution Manifold.

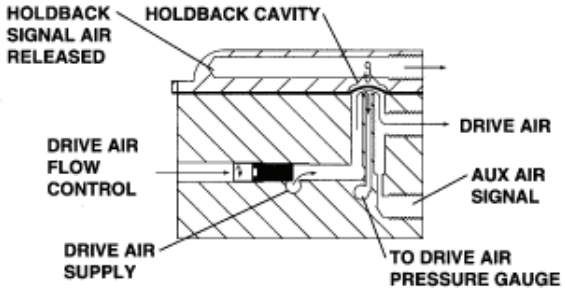


HANDPIECE FLUSH WATER FLOW

Drive Air Flow

Drive Air pressure for a handpiece is controlled by a Drive Air flow control in each control block. As the air passes through each block, it intersects with the Drive Air flow control valve bore.

Air flows past the Drive Air flow control and is routed to the top surface of the block. Until the Holdback Signal Air is released (the handpiece is lifted from its holder), the flow of air is blocked at this point.



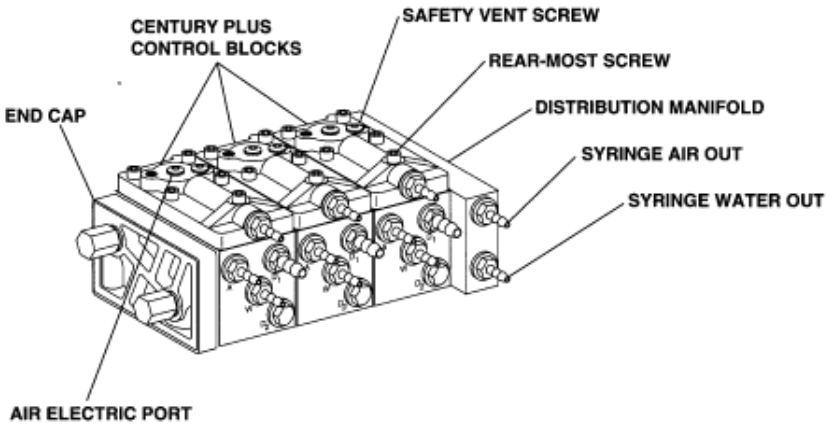
DRIVE AIR FLOW

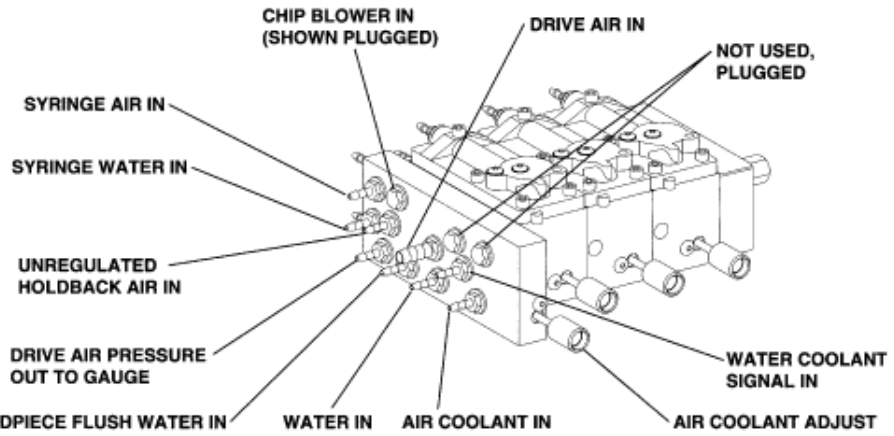
When the handpiece is lifted from its holder, (releasing holdback signal air), and the Foot Control is pressed, Drive Air will deflect the diaphragm into the top cap cavity and be routed out the Drive Air port at the rear of the block. Drive Air is also routed to the Drive Air Pressure passage for routing to the handpiece pressure gauge.

For troubleshooting information refer to the Century Plus Handpiece Control section

NOTES

Century Plus Handpiece Control Assembly





The A-dec Century Plus handpiece control system is functionally identical to the Century II handpiece control system. However, unlike the Century II control, Century Plus incorporates master block, handpiece flush, and air bleed functions into the control block system, reducing external tubing and connections.

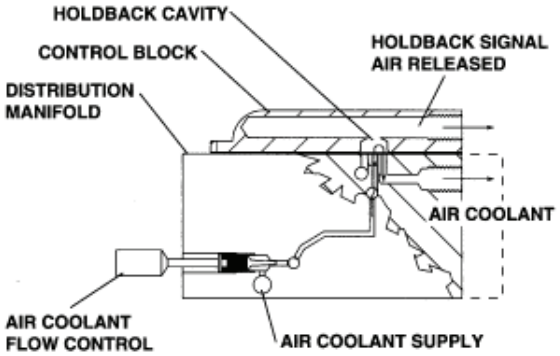
Distribution Manifold

The Distribution Manifold has all incoming air and water connected to it for distribution to the Century Plus control blocks, handpiece Drive Air pressure gauge, and syringe.

Air Coolant Flow

Air Coolant flow for the handpieces is controlled by a needle valve in the Distribution Manifold. Air Coolant is supplied to the Distribution Manifold from the Foot Control when the Foot Control is pressed. As the air passes through the Distribution Manifold, it intersects with the Air Coolant Flow Control needle valve bore.

Air flows past the needle valve seat and is routed to the Air Coolant passage of the control block. Within each block the air flow is routed to the top surface of the block. Until the Holdback Signal Air is released (the handpiece is lifted from its holder), the flow of air is blocked at this point.

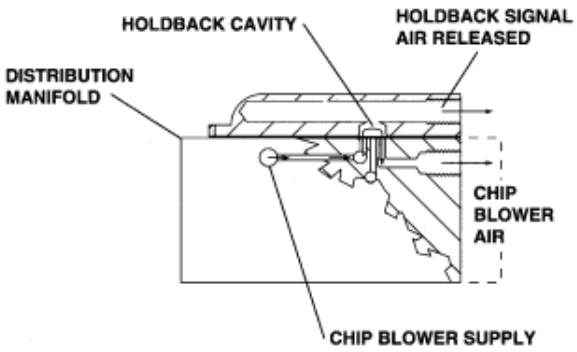


AIR COOLANT VALVE

Chip Blower Flow

Chip Blower air is supplied to the Distribution Manifold from the Foot Control when the Foot Control Chip Blower button is pressed. The air is routed to the Chip Blower passage of the control block.

Within each block the air flow is routed to the top surface of the block. Until the Holdback Signal Air is released (the handpiece is lifted from its holder), the flow of air is blocked at this point.

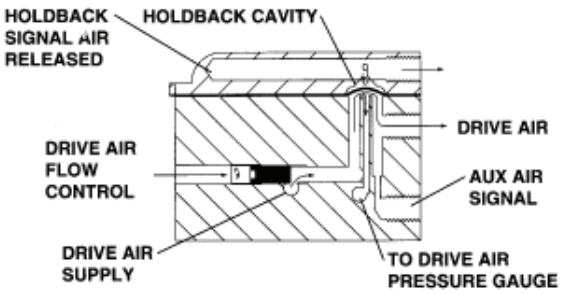


CHIP BLOWER FLOW

Century Plus Handpiece Control Assembly

Drive Air Flow

Drive Air is supplied to the Distribution Manifold from the Foot Control when the Foot Control is pressed. The Distribution Manifold routes the air flow to the Drive Air passage of the control block.



DRIVE AIR FLOW

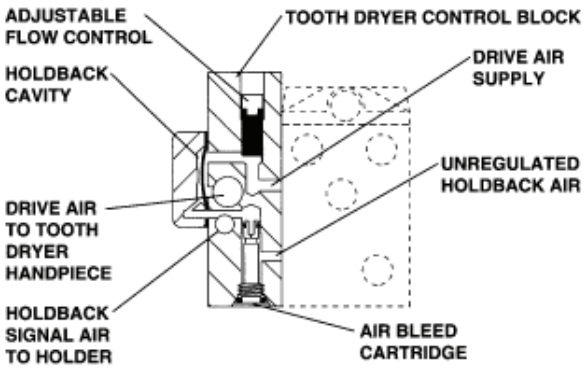
Tooth Dryer Air Flow

When installed, the Tooth Dryer Control Block replaces the End Cap in a Century Plus Handpiece Control Module. Drive Air supplied to the Distribution Manifold from the Foot Control is routed to the tooth dryer.

Drive Air pressure for the tooth dryer is controlled by an adjustable flow control in the control block. As the air passes into the block, it intersects with the air flow control bore.

Air flows past the valve and is routed to the outside surface of the block. Until the Holdback Signal Air is released (the tooth dryer is lifted from its holder), the flow of air is blocked at this point. Refer to page 6 for a complete discussion of the handpiece holdback system.

When the tooth dryer is lifted from its holder, releasing holdback signal air, and the Foot Control is pressed, Drive Air will deflect the diaphragm into the cap cavity and be routed out the port at the rear of the block.



TOOTH DRY AIR FLOW

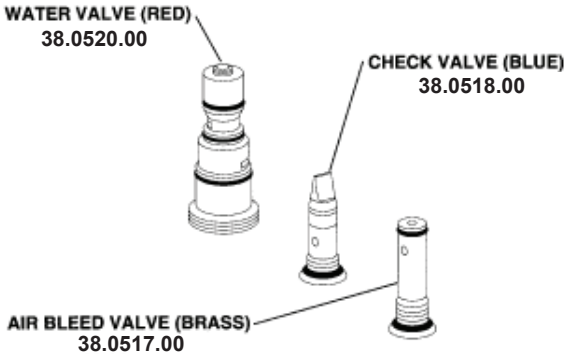
Century Plus Control Block Cartridges

Each Century Plus control Block includes three cartridges (water valve, handpiece flush, and air bleed).

WARNING

Before loosening a screw or cartridge, turn the air and water supplies OFF and bleed pressure from the system. Failure to do so may result in the screw or cartridge being ejected from the block causing injury.

These cartridges are easily accessed from the underside of the dental unit. This allows you to easily replace parts without removing covers or the control block assembly from the dental unit.



CONTROL BLOCK CARTRIDGES

Century Plus Handpiece Control Assembly

TROUBLE SHOOTING GUIDE				
			CORRECTIVE ACTION	
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	IF TEST IS NORMAL	IF TEST IS ABNORMAL
Water is leaking from a Handpiece Control Block.	Water Coolant Flow Control Valve is leaking.	Remove the valve stem from the block and inspect the o-ring, valve stem and the bore of the block for damage.	Reassemble and test the unit.	Replace all defective parts. Reassemble and test the unit.
	Water Valve Cartridge is leaking.	Verify that the Water Valve Cartridge is properly seated.	Proceed with the next step.	Tighten the Cartridge. Retest the unit.
		Exchange the suspected cartridge with a known good one and test the control block the suspected cartridge was installed in.	Inspect the first Control Block bore. If the bore is damaged, replace the Control Block.	Replace the suspected cartridge.
	Handpiece Flush Cartridge is leaking.	Verify that the Handpiece Flush Cartridge is properly seated.	Proceed with the next step.	Tighten the Cartridge. Do not over-tighten the cartridge, you may damage the Control Block. Retest the unit.
	Control Block assembly tie bolts are loose.	Verify that the assembly tie bolts are tight.	Go to the next step.	Tighten the ties bolts and retest the unit.
	Control Block side gasket has failed.	Verify that the assembly tie bolts are tight, then retest the unit. If the leakage continues, replace the gasket.	No further action is required.	Inspect the mating surface of the block. If the surface is damaged, replace the block.
Water is leaking from the water vent hole.	The Water Valve Cartridge has failed.	Exchange the suspected cartridge with a known good one and test the control block the suspected cartridge was installed in.	Inspect the first Control Block bore. If the bore is damaged, replace the Control Block.	Replace the suspected cartridge.
Water is leaking from all the handpieces.	The Handpiece Flush Toggle Valve is stuck open.	Use a hemostat to clamp off the blue tube close to the outlet barb of the Flush Valve. Check to see if handpiece leakage has stopped.	If the leakage stops, replace the Flush Valve.	
Water is leaking from all the handpieces except the one being used.	The Handpiece Flush Cartridge in the active Control Block has failed.	Remove and inspect the Handpiece Flush Cartridge from the Control Block.	Inspect the Control Block bore. If the bore is damaged, replace the Control Block.	If the cartridge is damaged, it must be replaced.

Century Plus Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Water is leaking from a handpiece in or out of its holder, with the Master On/Off in the ON position.	The Water Valve Cartridge has failed.	Exchange the suspected cartridge with a known good one and test the control block the suspected cartridge was installed in.	Inspect the first Control Block bore. If the bore is damaged, replace the Control Block.	Replace the suspected cartridge.
No Coolant Water from any of the handpieces.	The Wet/Dry Toggle on the Foot Control is in the dry position.	Check the Wet/Dry Toggle to assure that is in the Wet position.	If the toggle is in the Wet position, go to the next step.	Move the toggle to the Wet position and test the unit.
	The Water Coolant Flow Controls require adjustment.	While running a handpiece at medium speed turn the handpiece Water Coolant Control until a fine mist is visible around the bur.	Repeat the adjustment for the remaining handpieces.	Go to the next step.
	The Manual Water Shut-Off Valve in the utility center is turned off.	Remove the cover from the utility center and confirm that the Manual Water Shut-Off Valve is ON>	Go to the next step.	Turn the valve On and retest the unit.
	The Manual Water Shut-Off Valve, in the utility center, screen is clogged.	Refer to the instructions for the Manual Shut-Off Valve and follow the procedure described there.		Go to the next step.
	No Water Coolant Signal from the Signal Relay in the Foot Control.	Refer to the instructions for the Signal Relay Valve and follow the procedure described there.		Go to the next step.
	Pinched Water Coolant Signal tubing from the Foot Control.	Check the short dashed green line from the foot control for crimped tubing.	If no crimp is found, go to the next step.	Remove any crimps from the tubing and test the unit.
	The water filter in the utility module is plugged.	Refer to the instructions for Filters and follow the procedure described there.		Go to the next step.

Century Plus Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	The water pre-regulator has failed or requires adjustments.	Refer to the instructions for Pre-Regulators and follow the procedure described there.		Go to the next step.
	Pinched tubing in the water supply system.	Use a hemostat to clamp off the red tubing that goes to the Water In barb on the Distribution Manifold. Remove this line from the manifold. Be sure the Master On/Off toggle is in the ON position. Direct the end of the red tube into a container and briefly remove the hemostat. Check for water flow.	Reinstall the red tubing. Check the Control Block nearest the Distribution Manifold for obstructions.	Check the water supply tubing for crimps in the tubing.
No Coolant Water from one handpiece	The Control Block top cap diaphragm is installed incorrectly.	Be sure the Master On/Off toggle is in the OFF position and bleed the system of air and water pressure. Remove the top cap of the Control Block. Be sure the tab on the diaphragm is in the front left corner of the block when you are facing the Drive Air and Water Coolant adjustments.	If the diaphragm is properly installed, reinstall the cap and go to the next step.	If the diaphragm is installed incorrectly, reinstall it in the proper position and test the unit.
	The Water Valve Cartridge has failed.	Exchange the suspected cartridge with a known good one and test the control block the suspected cartridge was installed in.	Inspect the first Control Block bore. If the bore is damaged, replace the Control Block.	Replace the suspected cartridge.
	The Water Coolant Flow Control requires adjustment.	While running the handpiece at medium speed turn the handpiece Water Coolant Control until a fine mist is visible around the bur.		If adjusting the Water Coolant Flow Control does not work, go to the next step.
	The safety vent screw in the Control Block is loose or missing.	Verify that the safety vent screw is properly installed and is not leaking.	If the vent screw is properly installed, go to the next step.	Install or tighten the vent screw, then test the unit.
	The handpiece tubing is plugged.	Remove the handpiece from the handpiece tubing. Direct the tubing into a container and step on the foot control. Check for water running from the handpiece tubing.	The handpiece is plugged Refer to the handpiece manufacturers instructions.	If water does not run from the handpiece tubing, try running a small wire through the passage to dislodge debris from the nut and tubing and then test the unit. If this does not work, go to the next step.

Century Plus Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	The Handpiece Flush Cartridge has failed.	Exchange the suspected cartridge with a know good one and test the control block the suspected cartridge was installed in.	Inspect the first Control Block bore. If the bore is damaged, replace the Control Block.	Replace the suspected cartridge.
	The water valve actuator is missing or stuck.	Be sure the Master On/Off toggle is in the OFF position and bleed the system of air and water pressure. Remove the top cap of the Control Block. Press the water valve actuator to be sure it moves up and down.	Reassemble the Control Block and test the unit. If the problem persists, go to the next step.	Remove the water valve actuator and inspect it and the bore for damage. Replace any damaged components.
Inadequate Coolant Water at a handpiece.	The Water Coolant Flow Control for that handpiece requires adjustment.	While running the handpiece at medium speed turn the handpiece Water Coolant Control until a fine mist is visible around the bur.		If adjusting the Water Coolant Flow Control does not work, go to the next step.
	The Water Cartridge has failed.	Exchange the suspected cartridge with a know good one and test the control block the suspected cartridge was installed in.	Inspect the first Control Block bore. If the bore is damaged, replace the Control Block.	Replace the suspected cartridge.
	Pinched or kinked tubing in the water supply system.	Use a hemostat to clamp off the red tubing that goes to the Water In barb on the Distribution Manifold. Remove this line from the manifold. Be sure the Master On/Off toggle is in the ON position. Direct the end of the red tube into a container and briefly remove the hemostat. Check for water flow.	Reinstall the red tubing. Go to the next step.	Check for obstructions in the handpiece control assembly. If none are found, go to the next step.
	The handpiece tubing is partially plugged.	Remove the handpiece from the handpiece tubing. Direct the tubing into a container and step on the foot control. Check for water running from the handpiece tubing.	If water runs from the tubing, the handpiece is partially plugged. Refer to the manufacturers instructions.	If a small amount of water runs from the tubing, try running a small wire through the passage to dislodge debris from the nut and tubing and then test the unit. If this does not work, go to the next step.
	The water filter in the utility module is partially plugged.	Refer to the instructions for Filters and follow the procedure described there.		Go to the next step.

Century Plus Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	The handpiece tubing is pinched or kinked.	Inspect the handpiece tubing.	If the tubing is not pinched or kinked, retest the unit.	Straighten the tubing and retest the unit.
No Drive Air to a handpiece.	The Drive Air Flow Control for that handpiece requires adjustment.	While running the handpiece at medium speed turn the handpiece Drive Air Flow Control.	Adjust the Drive Air Flow Control until a strong flow of air has been obtained.	Go to the next step.
	The Handpiece Holder bleed valve has failed.	With the handpiece in its holder, loosen the rear-most cap screw on the Control Block one turn.	If you hear a slight puff of air, the bleed valve is functioning properly. Tighten the cap screw and go to the next step.	If you do not hear a slight puff of air, the Handpiece Holder bleed valve must be replaced.
	A Handpiece Flush Cartridge is installed in the Bleed Cartridge position.	Remove the cartridge from the Bleed Cartridge position.	If the cartridge is a Bleed Cartridge, reinstall it and go to the next step.	If the cartridge is a Handpiece Flush Cartridge, replace it with a Bleed Cartridge and retest the unit.
	Pinched or kinked Holdback Signal tubing between the Control Block and the handpiece holder.	Remove the handpiece from the handpiece tubing. Direct the end of the tubing into a container and step on the foot control.	If water flows from the tubing, the holdback function is working properly. Retest the unit.	If water does not flow from the tubing, check the red dashed yellow tubing that runs from the Master Toggle to the Holdback Air In barb on the distribution manifold for kinks. Straighten the tubing and retest the unit.
Inadequate Drive Air to all handpieces.	The Foot Control has failed.	Refer to the instructions for Foot Control II and follow the procedure described there.		Go to the next step.
	The air regulator or pre-regulator has failed or requires adjustment.	Refer to the instructions for Pre-Regulators and follow the procedure described there.		Go to the next step.

Century Plus Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	The air filter in the utility module may be partially plugged.	Refer to the instructions for Filters and follow the procedure described there.		Go to the next step.
	The Drive Air supply tubing may be kinked.	Remove the black dashed orange tubing from the Drive Air In barb on the distribution manifold. Step on the foot control and check for air flow.	If there is a strong flow of air, reinstall the tubing and go to the next step.	Trace the tubing back to its connection with the Foot Control tubing. Straighten any kinks in the tubing and retest the unit.
	The air-supply to the unit may be inadequate.	Verify that the instrument air supplied to the unit is the minimum required by the handpiece manufacturer. The typical requirement for a single high-speed handpiece is 1.5 CFM at 35 PSI. The typical requirement for a single low-speed handpiece is 3.0 CFM at 40 PSI. An A-dec unit equipped with an AVS or similar accessory may require up to 5 CFM at 70 PSI.		
Inadequate Drive Air to a handpiece.	The Drive Air Flow Control for that handpiece requires adjustment.	While running the handpiece at a medium speed turn the handpiece Drive Air Flow Control.	Adjust the Drive Air Flow Control until a strong flow of air has been obtained.	Go to the next step.
	The Auxiliary Drive port (D2) on the back of the Control Block is leaking.	Verify that the port plug or barb is tight and has a gasket under it.	If the barb or plug is tight and there is no leakage, go to the next step.	If the barb or plug leaks, tighten it or replace the gasket. Retest the unit.
	The Control Block top cap is leaking Drive Air.	Verify that no air is leaking from under the cap.	If there is no leakage, go to the next step.	If there is leakage, tighten the top cap screws. Retest the unit.
	The Control Block top cap gasket is perforated and leaking.	Remove the top cap from the Control Block and carefully inspect it for perforations.	Reinstall the gasket and go to the next step.	Replace the gasket and retest the unit.
	The Drive Air Flow Control stem o-ring is damaged.	Remove the Drive Air Flow Control stem from the Control Block and carefully examine the o-ring for damage.	Reinstall the stem and go to the next step.	Replace the o-ring and retest the unit.

Century Plus Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	The Handpiece Holder bleed valve has failed.	With the handpiece in its holder, loosen the rear-most cap screw on the Control Block one turn.	If you hear a slight puff of air, the bleed valve is functioning properly. Tighten the cap screw and go to the next step.	If you do not hear a slight puff of air, the Handpiece Holder bleed valve must be replaced.
	The handpiece exhaust tubing is restricted.	Verify that the handpiece exhaust tubing is not restricted or pinched.	Go to the next step.	Remove the restriction and retest the unit.
	If a Tooth Dryer is installed in the unit its tubing or Control Block may be leaking.	Verify that all tubing, tubing connections and the Control Block are not leaking Drive Air.	Go to the next step.	Correct all leakage problems and retest the unit.
	The handpiece demand for Drive Air exceeds the capacity of the control.	Install an air pressure booster valve. A-dec Kit Number 90-0302-00. Instructions are included.		
No Air Coolant at one handpiece.	The handpiece may be plugged or the handpiece tubing may be kinked, pinched or have a hole in it.	Verify that the handpiece is not plugged, kinked or pinched by running a small wire through the passages of the tubing. Inspect the tubing for holes.	Retest the unit.	Straighten the tubing and remove all obstructions. If the tubing has a hole in it, it must be replaced.
Inadequate Air Coolant at all handpieces.	The Air Coolant Flow Control may require adjustment.	While running the handpiece at medium speed turn the handpiece Air Coolant Flow Control until a strong flow of air is obtained.		If adjusting the Air Coolant Flow Control does not work, go to the next step.
	The Air Coolant tubing from the Foot Control may be kinked, pinched or have a hole in it.	Verify that the Air Coolant tubing is not kinked or pinched. Inspect the tubing for holes.	If the tubing is not kinked or pinched, and does not have a hole in it, go to the next step.	Straighten the tubing and retest the unit. If the tubing has a hole in it, it must be replaced.

Century Plus Handpiece Control Assembly

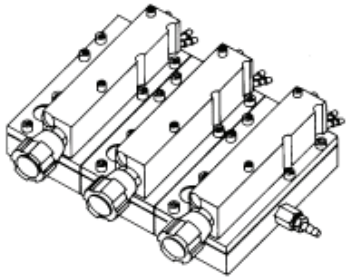
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	The Foot Control tubing may be kinked, pinched or have a hole in it.	Verify that the Foot Control tubing is not kinked or pinched. Inspect the tubing for holes.	If the tubing is not kinked or pinched, and does not have holes in it, go to the next step.	Straighten the tubing and retest the unit. If the tubing has a hole in it, it must be replaced.
	The Foot Control valve or relay may have failed.	Refer to the instructions for Foot Control II, Foot Control Valve and Signal Relay Valve and follow the procedure described there.		Go to the next step.
	The Air Coolant Flow Control stem o-ring may be damaged.	Remove the Air Coolant Flow Control stem from the Distribution Manifold and carefully examine the o-ring for damage.	Reinstall the stem and go to the next step.	Replace the o-ring and retest the unit.
Inadequate Air Coolant at one handpiece.	The handpiece or handpiece tubing may be partially plugged.	Run a small wire through the passages of the handpiece tubing to. remove debris.	Retest the unit. If the problem persists, go to the next step.	Clear the tubing of debris and retest the unit. If the problem persists, go to the next step.
	The Control Block top cap gasket is perforated and leaking.	Remove the top cap from the Control Block and carefully inspect it for perforations.	Reinstall the gasket and retest the unit.	Replace the gasket and retest the unit.
All handpieces run while in their holders when the Foot Control is pressed.	Loose or missing Bleed Air Cartridges.	Verify that there is a Bleed Cartridge in each Control Block and that each is properly seated. Do not over-tighten the cartridge, you may damage the control block.	Go to the next step.	Install new Bleed Cartridges where required. Retest the unit.
	The Unregulated Holdback Signal air supply is not getting to the Control Block Assembly.	Use a hemostat to clamp of the red dashed yellow line that connects to the Unregulated Holdback Air In barb of the distribution manifold. Remove the tubing from the distribution manifold. Release the hemostat pressure on the tubing and listen for air passage.	Check the distribution manifold for blockage.	Refer to the instructions for Filters, Pre-Regulators and Pilot-Operated Regulators and follow the procedure described there.

Century Plus Handpiece Control Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
One handpiece runs while in its holder when the Foot Control is pressed.	The handpiece Control Block Bleed Cartridge may be plugged.	Exchange the suspected cartridge with a know good one.	If the handpiece for the block you put the known good cartridge into runs in its holder, go to the next step.	If the handpiece for the block you put the suspect cartridge into now runs in its holder, the Bleed Cartridge is plugged and should be replaced.
	The rear-most cap-screw on the top of the Control Block may be loose.	Verify that the cap-screw is properly tightened and not leaking air.	If the cap-screw is tight and leak free, go to the next step.	After tightening the cap-screw, retest the unit.
	The Handpiece Holder bleed valve may have failed.	With the handpiece in its holder, loosen the rear-most cap screw on the Control Block one turn.	If you hear a slight puff of air, the bleed valve is functioning properly. Tighten the cap screw an go to the next step.	If you do not hear a slight puff of air, the Handpiece Holder bleed valve must be replaced.
	The air-electric switch port plug on the top of the Control Block may be loose or missing.	Verify that the air-electric switch port on the top of the Control Block is plugged and the screw is properly tightened.		Tighten the screw and retest the unit.

NOTES

Century Pac



Description

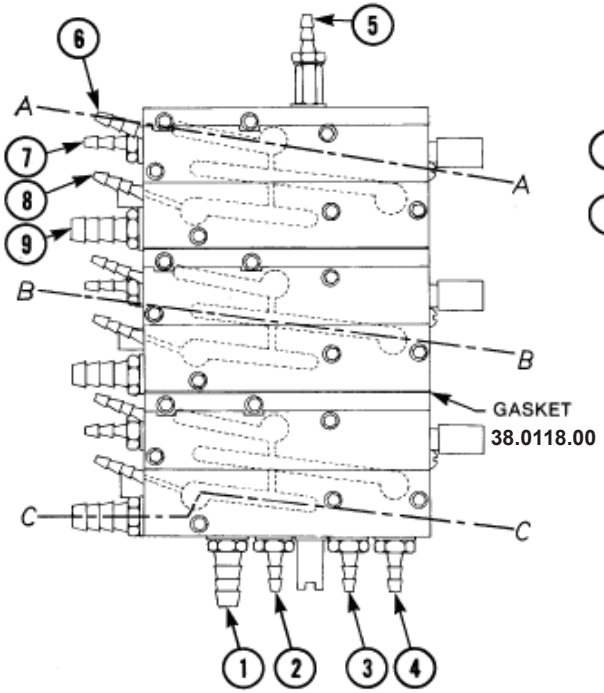
The Century Pac is the heart of the A-dec Century automatic handpiece control system (See page B-5). It is available in various configurations for two to five handpieces, any of which may be with or without water coolant. Each handpiece is connected to a Century Block, which is fastened together with others to make up the Century Pac.

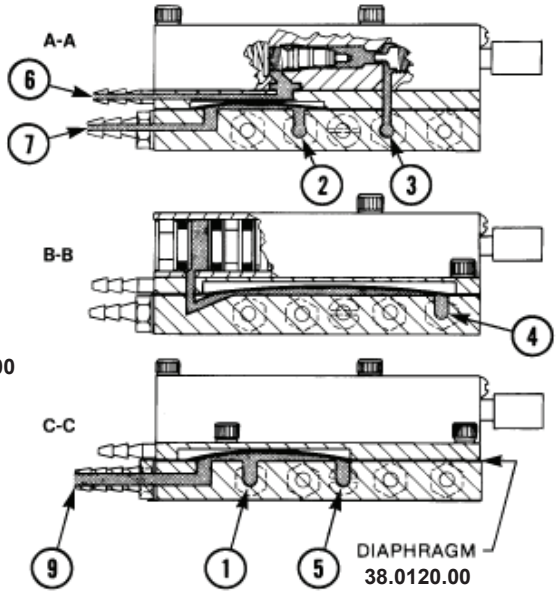
Operating Principles

The Century Block consists of a control block, a diaphragm and a cap. The control blocks are butted together to share a common set of passages for the drive air, air coolant, pressure gauge, coolant water, and water coolant signal. Between these passages and the handpiece, the drive air, air coolant, and water coolant signal must travel laterally across the surface of the block, through channels machined into the mating surface of the cap.

These channels are shown by the phantom lines on the center illustration; then each channel is shown separately on one of the cross section drawings on the right.

Sandwiched between the cap and the block is a diaphragm. As long as air pressure is applied to the holdback signal inlet, this diaphragm is pressed tightly against the surface of the block, thus preventing any flow through the channels in the cap. The holdback signal is applied whenever the handpiece is in its hanger, to actuate the hanger valve. Thus the only handpiece that responds to the foot control is the one that is out of its hanger.





IDENTIFICATION OF INLETS & OUTLETS

1. DRIVE AIR INLET	6. COOLANT WATER OUTLET
2. AIR COOLANT INLET	7. AIR COOLANT OUTLET
3. WATER COOLANT INLET	8. HOLDBACK SIGNAL INLET
4. WATER COOLANT SIGNAL INLET	9. DRIVE AIR OUTLET
5. PRESSURE GAUGE OUTLET	

The Century Water Valve (38-0098-00), which is described on another page, mounts on the Century Block and functions with it, to complete the system. When water coolant is not required for a handpiece, a blank cover (38-0130-00) is installed in place of the water valve.

Section A-A shows the water coolant flow path through the Century Block and water valve. The air coolant flow path is also shown on Section A-A. Section B-B shows the path of the water coolant signal through the Century Block to the water valve. Section C-C shows the path of the drive air.

Adjustment

The Century Pac has two adjustments for each handpiece, to control the drive air pressure and the coolant water flow. The water adjustment is on the front of the unit, while the handpiece pressure adjustments are inside the unit on the back of the Century Pac. A 3/32-inch allen wrench is used to adjust the handpiece pressure. This is done by running the handpiece with the foot control fully depressed, and adjusting for a gauge reading of 32 psi, or whatever is specified by the handpiece manufacturer.

TROUBLESHOOTING GUIDE				
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Audible air leakage.	Loose connections.	Check for leakage with all the handpieces in their hangers and the Foot Control depressed. If necessary, use a soap solution to locate the exact point of leakage. Tighten the tie bolt that secures the blocks together and the socket-head screws that secure the cap to the block.	If no leakage is found on the Century Pac, check the water valve and surrounding components.	If tightening the fasteners fails to stop the leakage, proceed with the next step.
	Defective gasket or diaphragm seal.	For leakage between the blocks, replace the gaskets. Note that there are two gaskets at each joint. For leakage between the block and cap, replace the diaphragm.	If leakage is stopped, no further action is required.	If leakage continues, check for flaws in the sealing surfaces. If the cap will not seal, it may be warped. Replace any defective parts.
Water leakage.	Loose connections.	Depending on the point of leakage, tighten the socket-head screws that secure the cap to the block, or the tie bolt that holds the blocks together.	If this stops the leakage, no further action is required.	If tightening the fasteners fails to stop the leakage, proceed with the next step.
	Defective gasket, O-ring, or diaphragm seal.	For leakage between the blocks, replace the gaskets. Note that there should be two gaskets at each joint. For leakage between the block and the cap, replace the diaphragm. For leakage between the Century Pac and the Water Valve, replace the O-rings.	If this stops the leakage, no further action is required.	If leakage continues, check for flaws in the sealing surfaces. If the cap will not seal, it may be warped. Replace any defective parts.
Air bubbles in the coolant water.	Defective O-ring on the connector tube at the syringe terminal.	Refer to the instructions for the syringe and follow the procedure described there.		If air bubbles still appear in the water system, proceed with the next step.
	Defect in the Water Regulator (Century Pac okay.)	Clamp a hemostat on the water supply tubing where it connects to the Century Pac. Run water from some other outlet, such as the syringe, and see if bubbles are present.	If there is no air in the other water outlets, proceed with the next step.	If there is air in the water at other outlets, refer to the instructions for the Pilot-Operated Regulators.

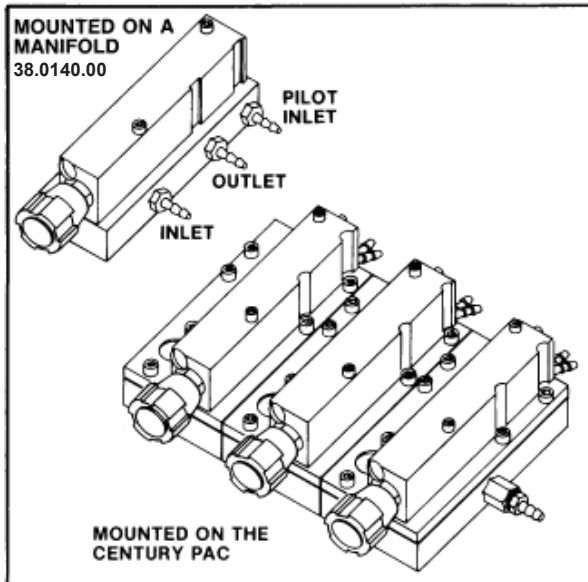
Century Pac

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Loose fasteners.	Tighten the socket-head screws that secure the Water Valve and cap to the Century Pac block, and tighten the tie bolt that secures the blocks together.	If this corrects the problem, no further action is required.	If there is still air in the water, proceed with the next step.
	Hole in the diaphragm or defective gasket or diaphragm seal.	Disassemble the Century Pac and inspect the diaphragm for wear, damage or deterioration. Replace it if it is defective.	If this corrects the problem, no further action is required.	If the problem persists, the cap may be warped. Replace it, re-assemble and test the unit.
Air or water leaks from a handpiece in its hanger, while another handpiece is in use.	Defective diaphragm or damaged diaphragm sealing surface on the control block.	Take the handpiece out of its hanger, then remove the Century Water Valve and cap from the control block. Visually inspect the diaphragm and control block for defects.	If there are no defects, carefully clean all parts. Re-assemble the Century Block and test the unit.	Replace any defective parts. Re-assemble and test the unit.
Water leaks from all handpieces while one handpiece is in use.	Regulated air pressure is too low, or water pressure is too high.	Check the gauges in the utility center. The air pressure should be 80 psi and the water pressure should be 40 psi.	If the pressures are correct, look for a restricted tube between the regulator and the hanger valve supply manifold.	If the pressures are incorrect, refer to the instructions for the Pre-Regulator for the adjusting procedure.
A handpiece that is in its hanger operates while another handpiece is being used.	Handpiece not properly seated in its hanger.	Lift the handpiece, then place it back in its hanger, making sure it seats properly and moves the valve actuator.	If this corrects the problem, no further action is required.	If the problem persists, proceed with the next step.
	The Micro-Valve in the handpiece hanger does not open.	Refer to the instructions for the Three-Way Micro-Valve, for the test procedure.	If the Micro-Valve works properly, proceed with the next step.	Take corrective action as indicated in the Three-Way Micro-Valve instructions.
	Defective diaphragm in the control block.	Take the handpiece out of its hanger, then remove the Century Water Valve and cap from the control block. Visually inspect the diaphragm for defects.	If the diaphragm is not defective, check for pinched tubing between the hanger valve and the cap, or for a clogged barb in the cap.	Replace the diaphragm if there are any cracks or holes, or if the material is stiff.

Century Pac

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
The wrong handpiece operates.	Two handpieces are in the wrong hangers.	If a handpiece operates when it is in the hanger, while another handpiece that is not in a hanger fails to operate, the two are in each others hangers. Switch them around.	Unless this results in crossed tubings, no further action is required.	If the tubing is crossed as a result of the switch, it may be desirable to rearrange the hangers on the bar.
One handpiece does not operate when it is out of its hanger.	Handpiece holder set in the LOCKED OUT position.	Check the toggle on the handpiece hanger. It should be flipped toward the red dot. On the earlier type of handpiece holders, try turning the lock-out stem counter-clockwise.	If it is already set properly, proceed with the next step.	If it was set in the wrong position, turn it the other way and re-test the unit.
	The Micro-Valve in the handpiece hanger is not working properly.	With the handpiece out of its hanger, disconnect the holdback signal tube from the outlet barb on the Micro-Valve.	If no air comes from the valve, and the handpiece still does not work, check for a crimped handpiece tube.	If there is air flowing from the valve, or if the handpiece now operates, refer to the instructions for Three-Way Micro-Valves.
Restricted flow of air or water.	Debris blocking internal passages.	Check first for pinched tubing or other restriction outside the Century Pac. If you isolate the problem to the Century Pac, remove the barbs and check for debris there, before disassembling the Century Pac itself.	If no debris is found, re-assemble and test the unit.	Clean all debris from the barbs and passages. Make sure no tubes are pinched.
Coolant sometimes sprays momentarily from the handpieces as they are lifted from their hangers.	Foot Control Valve fails to exhaust when it is released.	Refer to the instructions for the Foot Control Valve for the test procedure.		Take corrective action as indicated in the Foot Control Valve instructions.
A steady flow of coolant sprays from the handpieces as soon as they are lifted from their hanger.	Signal Relay on the Foot Control does not shut off.	Refer to the instructions for the Signal Relay Valve for the test procedure.		Take corrective action as indicated in the Signal Relay Valve instructions.

Century Water Valve

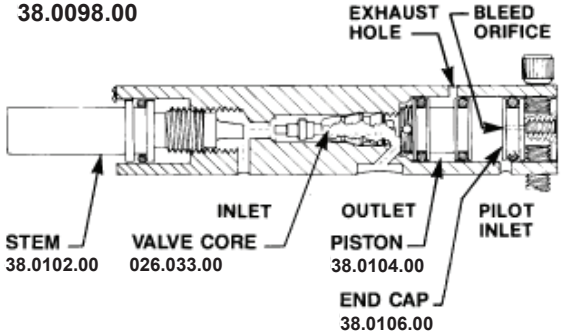


The Century Water Valve is a combination flow control needle valve, pilot-operated water relay valve, and coolant water retraction valve. It is designed for integral mounting on the Century Pac handpiece control system, or for mounting on a manifold for use in manual control systems.

The pilot air signal enters at the rear of the valve and pushes the piston forward to depress the stem of the valve core, thus opening the valve. The sectional drawing shows the valve in an actuated condition. When the pilot signal is shut off, the piston moves back and the valve core closes. The rearward movement of the piston draws a small amount of water from the outlet back into the valve, to prevent dripping from the handpiece. The needle valve controls the flow of water into the valve core.

The procedures for disassembling and servicing the valve are given in the troubleshooting table that follows.

CENTURY WATER VALVE
38.0098.00



TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Water drips from the handpiece when it is not in use.	Loose or defective valve core.	Remove the hold-down screw from the rear of the valve, then remove the end cap. Insert the screw into the valve bore and thread it into the piston, then pull the piston and spring from the valve. Tighten the valve core with tool no. 98-100.	If the leakage stops, re-assemble and test the valve.	If the leakage cannot be stopped by tightening the valve core, install a new one.
Water flows from a handpiece that is in its hanger when the Foot Control is pressed.	Plugged orifice in the end cap, or end cap without an orifice.	If either of these problems exists, signal air may be trapped in the valve bore. If there is no screw in the end cap, it should be replaced. If there is a screw, apply a soap solution around it. Lift the handpiece and press the Foot Control. Watch for air seepage around the screw.	If there is air seepage, proceed with the next step.	If there is no seepage, install a new end cap, then re-test the valve.
	Defective diaphragm in the Century Pac.	Disassemble the Century Pac and install a new diaphragm.	If this corrects the problem, no further action is required.	If the problem persists, check for a broken or missing spring under the piston.
Water leaking from the exhaust hole.	Wrong piston assembly.	Remove the rear mounting screw, then the end cap. Insert the mounting screw into the tapped hole in the piston, and pull the piston from the valve.	If there is a groove machined around the tapped hole, proceed with the next step.	If the end of the piston is smooth except for the tapped hole, install a new piston.

Century Water Valve

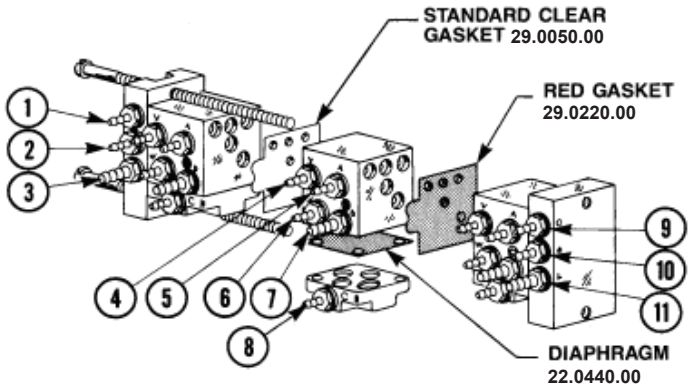
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Defective O-ring seal on the piston.	Inspect all parts for debris or defects.	If no defects are noted, re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.
Leakage around the stem.	Defective O-ring on the stem.	Turn the Master On-Off Valve OFF and bleed the air and water pressure from the system. Remove the knob, retainer screw, and stem from the valve. Inspect all parts and surfaces for debris or defects.	If no defects are found, clean all parts, re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.
Leakage at the base of the valve.	Loose screws.	Tighten the screws that secure the Water Valve in place.	If the leakage stops, no further action is required.	If the leaking continues, proceed with the next step.
	Defective O-ring seal under the Water Valve.	Turn the unit OFF and bleed all pressure from the system. Remove the Water Valve and inspect the O-rings and sealing surfaces for debris or defects.	If no defects are found, re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.
No water coolant from any of the handpieces.	No water coolant signal from the Foot Control.	While stepping on the Foot Control, turn the water coolant toggle valve ON and OFF. Listen for air to exhaust around the toggle each time the valve is turned OFF.	If air exhausts from the valve each time it is cycled, proceed with the next step.	If no air exhausts from the valve, refer to the instructions for the Signal Relay on the Foot Control.
	No water supply to the Century Pac (or manifold).	Verify that the water is turned on at the Manual Shut-Off Valve and that the system water pressure is 40 psi. Loosen the Water Valve hold-down screws and watch for leakage around the base of the valve.	If water is present, proceed with the next step.	If there is no water, check for an obstruction in the barb or passage in the Century Pac (or manifold) or in the tube from the water regulator.
	Clogged signal passage in the Century Pac (or manifold).	Turn OFF the water supply at the Manual Shut-Off Valve. Loosen the Water Valve hold-down screws, then step on the Foot Control and listen for air leakage around the base of the valve.	If the air signal can be heard, re-assemble and test the unit.	If no air can be heard, check for an obstruction in the barb or passage in the Century Pac (or manifold) or in the tube from the water coolant toggle valve.

Century Water Valve

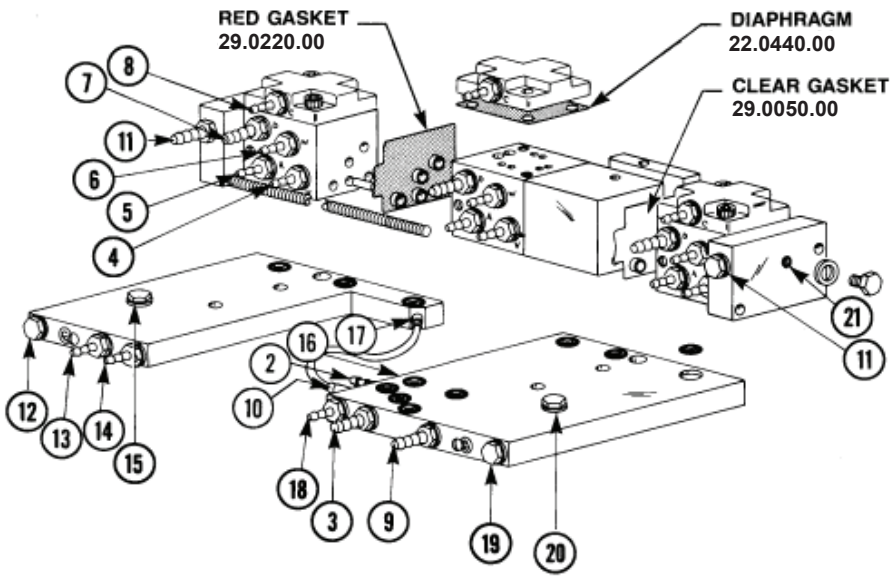
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No water coolant from one handpiece.	Closed needle valve.	Turn the flow control knob counter-clockwise, while running the handpiece.	If water coolant begins to flow, adjust the valve for the desired flow rate.	If there is no flow when the knob is fully counter-clockwise, proceed with the next step.
	No water coolant signal to the Water Valve.	Remove the socket-head capscrew from the back of the valve, then remove the end cap. Insert the screw into the valve bore and thread it into the piston. Lift the handpiece and step on the Foot Control. While the handpiece is running, press lightly on the screw that is threaded into the piston and listen for a jet of air from the bore of the valve.	If an audible air signal is present, proceed with the next step.	If no air can be heard, check for a clogged air passage in the Water Valve or the Century Pac.
	Valve core is screwed in too far.	Continuing from the preceeding test, release the Foot Control and place the handpiece in its hanger. Pull the piston and spring from the valve bore, then use a small screwdriver tip to locate and press the stem in the valve core.	If water flows from the valve, unscrew the valve core one full turn. (If it begins to leak, install a new valve core.) Re-assemble and test the valve.	If no water comes from the valve, proceed with the next step.
	Defective or clogged valve core.	Turn the Master On-Off Valve OFF, and bleed the system. Remove the valve core, then momentarily turn the Master On-Off Valve ON.	If water flows from the Water Valve, install a new valve core. Re-assemble and test the valve.	If no water comes from the valve, proceed with the next step.
	Clogged passage in the Water Valve or the Century Pac.	Remove the Water Valve from the Century Pac and inspect all internal passages. Remove the needle valve from the Water Valve and check for debris around the seat.	If no blockage is found, re-assemble and test the valve.	Clean all parts and passages, then re-assemble and test the valve.
Flow cannot be adjusted.	Stripped threads or defective seat on the needle valve stem.	Remove the stem, and inspect the threads and seat for defects.	If no defects are found, re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.

NOTES

Automatic Control Systems



AUTO-BLOCK SYSTEM
(REFER TO PAGE NO. B-10)



AUTO-PAC SYSTEM
(REFER TO PAGE NO. B-10)

IDENTIFICATION OF INLETS & OUTLETS

1. AIR COOLANT INLET
2. GAUGE OUTLET
3. DRIVE AIR (NON-LUBRICATED) INLET
4. HANGER VALVE AIR SUPPLY OUTLET
5. AIR COOLANT OUTLET
6. WATER COOLANT OUTLET
7. DRIVE AIR OUTLET
8. HOLDBACK SIGNAL INLET
9. REGULATED AIR INLET
10. WATER COOLANT INLET
11. LUBRICATED DRIVE AIR INLET
12. SYRINGE WATER OUTLET (OPTIONAL USE)
13. REGULATED WATER INLET
14. WATER COOLANT SIGNAL INLET
15. REGULATED WATER OUTLET
16. SIGNAL AIR OUTLET
17. WATER COOLANT CONTROL VALVE OUTLET
18. CHIP BLOWER INLET (OPTIONAL USE)
19. SYRINGE AIR OUTLET (OPTIONAL USE)
20. REGULATED AIR OUTLET
21. OUTLET FOR AIR ELECTRIC SWITCH

Description

The A-dec Automatic Control System eliminates the need for a handpiece manual selector valve. Through a system of manifolds, control blocks and valve-equipped handpiece hangers, the drive air and the air and water coolants are automatically routed only to the handpiece that has been lifted from its hanger.

The illustrations show two configurations of the Automatic Control System. On the left, the Auto-Block System consists of one control block for each handpiece, with end caps that serve as manifolds. This system works in conjunction with the air and water coolant valves as shown on Page B-11.

On the right, the Auto-Pac system is basically the same as the Auto-Block system, except that it incorporates a pair of flat manifolds on which the control block assembly and the coolant valves are directly mounted, thereby eliminating the interconnecting tubing and making the system more compact. A distribution block carries the air and water from the manifolds to the control blocks. The manifolds also have air and water outlets whose flow is controlled by integral needle valves, for connecting a three-way syringe without the need for a separate syringe block. These are the outlets located on the rear of the manifolds, next to the adjusting screws.

Operating Principles

Each of the control blocks consists of a base block, a diaphragm, and a cap. The control blocks are stacked together to share a common set of passages for the drive air, air coolant, pressure gauge, coolant water, and regulated air supply. Between the passages and the handpiece connections, the drive air, air coolant, and water coolant must pass laterally across the surface of the block through small machined cavities in the mating surface of the cap.

Sandwiched between the cap and the block is a diaphragm. As long as air pressure is applied to the holdback signal inlet, this diaphragm is pressed tightly against the surface of the block. The holdback signal is applied whenever the handpiece is in its hanger, so only a handpiece that is out of its hanger can respond to the foot control.

Adjustments
The control blocks each have an adjusting screw that controls the maximum dynamic drive air pressure delivered to the handpiece. With the handpiece running and the foot control fully depressed, use a 3/32-inch allen wrench to adjust the pressure to the maximum specified by the handpiece manufacturer.

On the Auto-Pac, if the syringe outlets are used, adjust the air and water to achieve the desired spray pattern from the syringe.

Lubricated Drive Air
The Automatic Control System can be set up to accommodate one or more handpieces that require lubricated drive air. The illustrations here show both systems set up for using lubricated air. On the Auto-Block system, the control block on the right uses lubricated air; and on the Auto-Pac system, the control block on the left uses lubricated air. Note that the blocks using lubricated air are isolated from the others by a red gasket, where normally a clear gasket would be installed. The red gasket blocks the drive air passage between the blocks, so that the lubricated air can be brought in from the other end through the designated port (no. 11 in the illustrations.).

"Dry" Handpiece Illustration
When installing a handpiece that does not require water coolant, it is necessary to activate the cutoff valve on the water coolant valve. Install a "tee" fitting in the holdback signal tube that goes into the control block cap, and run a tube from there to the barb on the cutoff valve (refer to page B-10 or B-11).

Turn the cap on the rear of the cutoff valve so that the retainer pin seats in one of the grooves in the cap (see the instructions for the Water Coolant Valve). Remove the water coolant outlet barb (no. 6 in the illustrations) from the control block and replace it with a hex plug, part no. 021-016-00. A plug should also be installed in the air coolant outlet (no. 5 in the illustrations) if the air coolant is not to be used.

TROUBLESHOOTING GUIDE

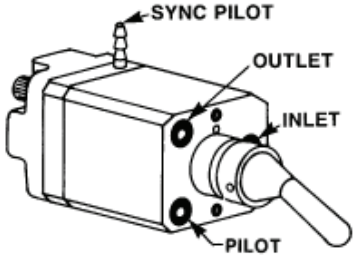
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
A handpiece that is in its hanger operates while another handpiece is being used.	Handpiece not properly seated in its hanger.	Lift the handpiece, then place it back in its hanger, making sure it seats properly and moves the valve actuator.	If this corrects the problem, no further action is required.	If the problem persists, proceed with the next step.
	The Micro-Valve in the handpiece hanger does not open.	Refer to the instructions for the Three-Way Micro-Valve, for the test procedure.	If the Micro-Valve works properly, proceed with the next step.	Take corrective action as indicated in the Three-Way Micro-Valve instructions.
	Defective diaphragm in the control block.	Take the handpiece out of its hanger, then remove the cap from the control block. Visually inspect the diaphragm for defects.	If the diaphragm is not defective, check for pinched tubing between the hanger valve and the cap, or for a clogged barb in the cap.	Replace the diaphragm if there are any cracks or holes, or if the material is stiff.
Air or water leaks from a handpiece in its hanger, while another handpiece is in use.	Defective diaphragm or damaged diaphragm sealing surface on the control block.	Take the handpiece out of its hanger, then remove the cap from the control block. Visually inspect the diaphragm and control block for defects.	If there are no defects, carefully clean all parts. Re-assemble the control block and test the unit.	Replace any defective parts. Re-assemble and test the unit.

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
One handpiece does not operate when it is out of its hanger.	Handpiece holder set in the LOCKED OUT position.	Try turning the lockout stem on the handpiece holder counter-clockwise. (On the newer, toggle-actuated hanger valves, the toggle should be flipped toward the red dot.)	If it is already set properly, proceed with the next step.	If it was set in the wrong position, turn it the other way and re-test the unit.
	The Micro-Valve in the handpiece hanger is not working properly.	With the handpiece out of its hanger, disconnect the holdback signal tube from the outlet barb on the Micro-Valve.	If no air comes from the valve, and the handpiece still does not work, check for a crimped handpiece tube.	If there is air flowing from the valve, or if the handpiece now operates, refer to the instructions for Three-Way Micro-Valves.
Air bubbles in the coolant water.	Defective O-ring on the connector tube at the syringe terminal	Refer to the instructions for the syringe and follow the procedure described there.		If air bubbles still appear in the water system, proceed with next step.
	Defective Water Regulator (control blocks okay).	Clamp a hemostat on the water supply tube going to the water coolant valve (or Auto-Pac manifold), then run water from another outlet in the system and see if bubbles are present.	If no air is present, proceed with the next step.	If there is air in the water at other outlets, refer to the instructions for the Pilot-Operated Regulators.
	Defective Water Coolant Valve (control blocks okay).	Turn the Air Coolant Valve toggle OFF, then run each of the handpieces for 20-30 seconds while observing the water coolant spray.	If the coolant water from any one of the handpieces is free of air, proceed with the next step.	If there is air in the coolant water from all the handpieces, check for a defective diaphragm in the Water Coolant Valve.
	Hole in a control block diaphragm.	Shut off the unit and bleed down the water and air pressures. Remove the cap from the control block for the handpiece whose water coolant was free of air in the preceeding test. Carefully inspect the diaphragm and sealing surfaces of the block and cap for defects.	If no defects are noted, re-assemble the control block and check all fasteners for tightness. Re-test the unit.	Replace any parts found to be defective. Re-test the unit.

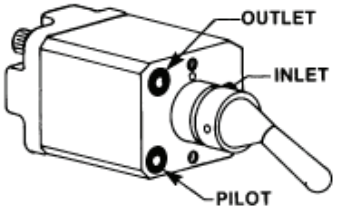
Automatic Control Systems

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Restricted flow of air or water.	Debris blocking internal passages.	Check first for pinched tubing or other restriction outside the control blocks. If you isolate the problem to the control block assembly, remove the barbs and check for debris there before disassembling the blocks themselves.	If no debris is found, re-assemble and test the unit.	Clean all debris from barbs and passages. Make sure no tubes are pinched.
The wrong handpiece operates.	Two handpieces are in the wrong hangers.	If a handpiece operates when it is in the hanger, while another handpiece that is not in a hanger does not operate, the two are in each others hangers. Switch them around.	Unless this results in crossed tubings, no further action is required.	If the tubing is crossed as a result of the switch, it may be desirable to rearrange the hangers on the bar.
Water leaks from all handpieces while one handpiece is in use.	Regulated air pressure is too low, or water pressure is too high.	Check the gauges in the utility center. The air pressure should be 80 psi and the water pressure should be 40 psi.	If the pressures are correct, look for a restricted tube between the regulator and control system inlet no. 9.	If the pressures are incorrect, refer to the instructions for the Pre-Regulator for the adjusting procedure.
Audible air leakage.	Loose connections.	Check for leakage with all the handpieces in their hangers and the Foot Control depressed. If necessary, use a soap solution to locate the exact point of leakage. Tighten the tie bolts that secure the blocks together, the barbs, and in the Auto-Pac system, the capscrews that secure the control block assembly to the manifolds.	If no leakage is found on the control block assembly, check for leakage from surrounding tubes and components.	If tightening the fasteners fails to stop the leaking, proceed with the next step.
	Defective gasket, diaphragm, or O-ring seal.	For leakage between the control blocks, replace the gasket; for leakage between the block and the cap, replace the diaphragm; and in the Auto-Pac system, for leakage where the control block assembly mounts on the manifolds, replace the O-rings.	If leakage stops, no further action if required.	If leakage persists, check for flaws in the sealing surfaces. Replace any defective parts.
Water leakage.	Loose connections.	Depending on the point of leakage, tighten the capscrews that secure the cap to the control block, the tie bolts that hold the control blocks together, or the capscrews that secure the control block assembly to the Auto-Pac manifolds.	If this stops the leakage, no further action is required.	If tightening the fasteners fails to stop the leakage, proceed with the next step.
	Defective gasket, diaphragm, or O-ring seal.	For leakage between the control blocks, replace the gasket; for leakage between the block and cap, replace the diaphragm; and for leakage between the control block assembly and the Auto-Pac manifolds, replace the O-rings.	If the leakage stops, no further action is required.	If leakage persists, check for flaws in the sealing surfaces. Replace any defective parts.

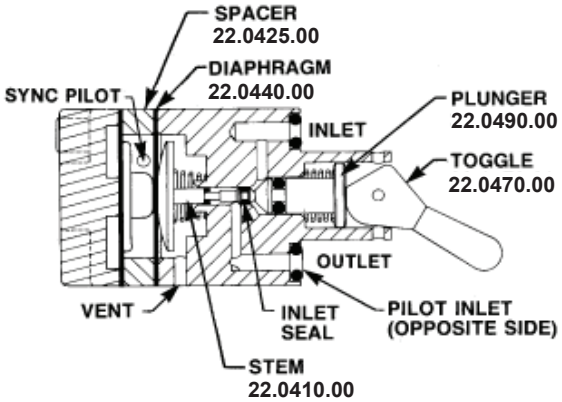
Air Coolant Valve

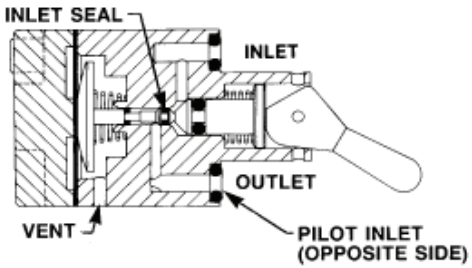


22.0940.00



22.0590.00
(REPLACES 22.0400.00)





The Air Coolant Valve is a manifold mounted, pilot operated, two-way relay valve with a manual "lock-out" toggle. The valve is used to control the flow of air coolant to the handpiece. The pilot signal that opens the relay valve comes from the foot control.

There are three types of air coolant valve. The earlier models (22-0400-00 and 22-0590-00), are directly interchangeable with one another, and use the drive air from the foot control as a pilot signal to actuate the relay. The pilot signal (drive air) enters the front of the valve through a manifold and is routed through an internal passage to the cover at the rear of the valve, where it deflects the diaphragm, thus moving the stem to open the valve. If the toggle is in the OFF position, it prevents the stem from moving and keeps the valve closed.

The more recent model, 22-0940-00, functions exactly as the earlier types described above, with the additional feature of a signal from the water coolant valve (22-0960-00) to synchronize the actuation of the air and water. This synchronizing pilot signal enters the valve and acts on a second diaphragm interposed between the first diaphragm and the stem. Systems that use this type of valve require foot controls equipped with a signal relay.

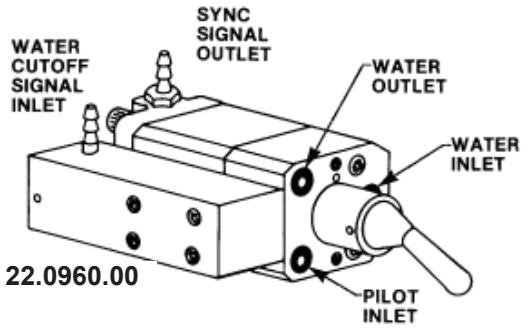
TROUBLESHOOTING GUIDE

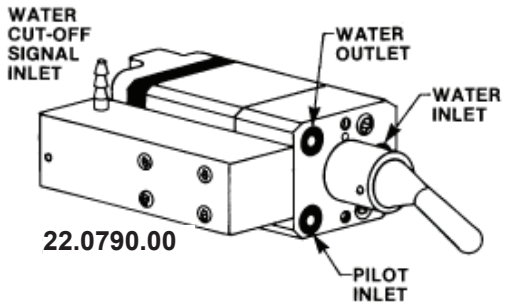
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No air coolant to the handpiece.	No flow through the Needle Valve (22-0370-00).	Refer to the Needle Valve instructions for the test procedure. To check the output from the Needle Valve, loosen the two screws that hold the Air Coolant Valve to its manifold, so the air that passes the Needle Valve can escape.	If the Needle Valve works properly, proceed with the next step.	Follow the instructions given with the Needle Valve test procedure.
	Defective diaphragm in the Air Coolant Valve.	Remove the two screws from the back of the valve, and separate the cover and spacer from the valve body. Inspect the diaphragm for cracks, perforations, or other defects. Press the stem to verify that it moves freely.	If neither of the diaphragms is defective, make sure that the passages in the valve body are all clear.	Replace any defective parts, reassemble and test the valve.

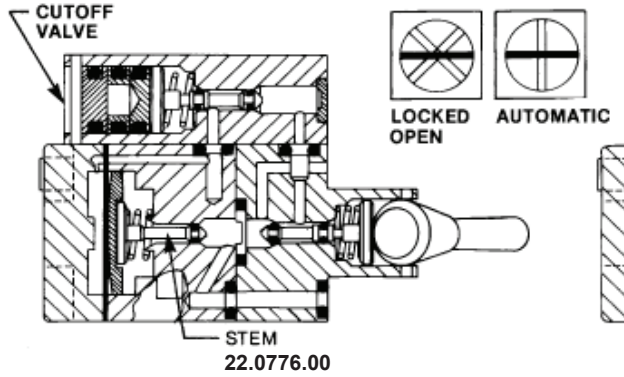
Air Coolant Valve

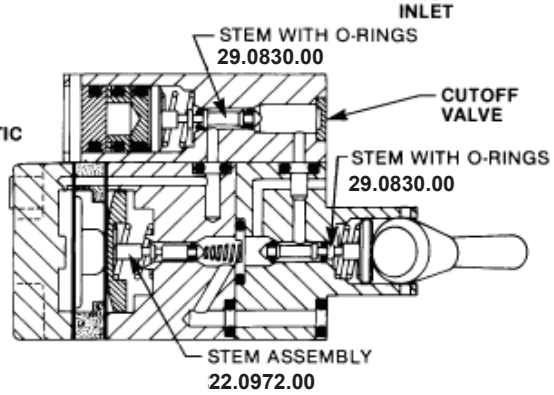
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Air coolant does not completely shut off when the Foot Control is released.	The air signal from the Signal Relay Valve does not shut off (Air Coolant Valve is okay).	If the Signal Relay does not shut off, the water coolant will also fail to shut off. Verify that this is the problem by turning the water coolant toggle OFF. This should stop both the air and water coolant flows. If it does, refer to the instructions for the Signal Relay for the test procedure.	If the coolant does not shut off, proceed with the next step.	Follow the instructions given with the Signal Relay Valve test procedure.
	Stem sticks or has a defective return spring.	Turn the air coolant toggle OFF. If this stops the flow of air coolant from the handpiece, turn the toggle back ON. Step on the Foot Control, then release it. Check for continued air coolant flow at the handpiece.	If working the toggle shuts off the air coolant flow, disassemble the valve and check for debris or defects that prevent the stem from returning to close the valve. Replace any defective parts. Re-assemble and test the valve.	If the air coolant stays on when the toggle is OFF, proceed with the next step.
	Defective O-ring seal on the end of the stem.	If the air coolant cannot be shut off with the air coolant toggle in the preceeding test, there is a defect in the inlet seal area. Disassemble the valve and check for a worn or damaged O-ring, stem, or bore.	If no defects are noted, thoroughly clean and lubricate the parts, then re-assemble and test the valve.	Replace any defective parts. Re-assemble and test the valve.
External leakage of air from the valve.	Loose fasteners.	Tighten the screws that hold the valve together. If the leak is between the spacer and the body, it will be necessary to remove the cover to gain access to the screws.	If the leaking stops, no further action is required.	If tightening the screws fails to stop the leakage, proceed with the next step.
	Defective seal around the O-rings or diaphragms.	Disassemble the valve and check the condition of the diaphragm or O-rings at the joint that is leaking. Replace any defective parts.	If the leaking stops, no further action is required.	If the leaking persists, check for defects in the sealing surfaces. Replace any defective parts. Re-assemble and test the valve.
NOTES				

Water Coolant Valve









The Water Coolant Valve controls the flow of water coolant to the handpiece in response to a pilot signal from the foot control. The Water Coolant Valve actually consists of three independent valves integrated into one manifold-mounted assembly: (1) the primary component is a pilot operated two-way water relay; (2) the toggle operates a three-way air valve that controls the pilot signal from the foot control; and (3) the cutoff valve is a pilot operated three-way air valve that interrupts the pilot signal to the water relay when a "dry" handpiece is being used.

There are two variations of the water coolant valve, as illustrated. The earlier model, 22-0790-00, uses the drive air from the foot control as a pilot signal to actuate the relay. The more recent design, 22-0960-00, requires a foot control equipped with a signal relay to provide the pilot signal. The other significant difference between the two is that the 22-0960-00 has an outlet on the rear cover for a signal to synchronize the actuation of the air coolant valve with the water coolant valve.

When servicing these valves, remember that the two designs are not directly interchangeable. If an older system is to be updated with the newer design of water coolant valve, the air coolant valve and foot control must be replaced with compatible components at the same time. Refer to page B-10, B-11, or B-12 for the system layout.

Also, when overhauling valves of either design manufactured after mid-1978, note that some of the O-ring grooves in the valve stems are not used. The cross-section drawings show the proper positions of the O-rings on all the stems.

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No water coolant to the handpiece.	No flow through the Needle Valve (22-0370-00).	Refer to the Needle Valve instructions for the test procedure. To check the output from the Needle Valve, remove the two screws that hold the Water Coolant Valve to its manifold, so the water that passes the Needle Valve can escape.	If the Needle Valve works properly, proceed with the next step.	Follow the instructions given with the Needle Valve test procedure.
	No air signal from the Signal Relay on the Foot Control.	Refer to the Signal Relay instructions for the test procedure. To check the output from the Signal Relay, disconnect the signal air tube where it enters the Water Coolant Valve manifold or the Auto-Pac manifold (see Page Nos. B-9, B-10, or B-11).	If the Signal Relay works properly, proceed with the next step.	Follow the instructions given with the Signal Relay test procedure.

Water Coolant Valve

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Cutoff Valve is improperly set.	Check the position of the adjustment cap on the Cutoff Valve. In all manual control systems, the adjustment cap should be in the LOCKED OPEN position (refer to the illustration above). It should also be in the LOCKED OPEN position in automatic controls that do not have a "dry" handpiece. The AUTOMATIC setting is used only in automatic control systems that have a "dry" handpiece.	If the adjustment cap is properly set, proceed with the next step.	If the adjustment cap is set in the AUTOMATIC position when it shouldn't be, push and turn it to the LOCKED OPEN position.
	No signal to the Cutoff Valve (This applies only when the AUTOMATIC setting is used. If the LOCKED OPEN setting is used, go to the next step).	Place the "dry" handpiece in its hanger, then turn the Cutoff Valve to the LOCKED OPEN position. Test the "wet" handpieces. If the water coolant works, it indicates that the air signal from the "dry" handpiece Hanger Valve is not reaching the Cutoff Valve. Refer to the Three-Way Micro-Valve instructions for the test procedure for the automatic handpiece hanger.	If there is no water coolant even when the Cutoff Valve is in the LOCKED OPEN setting, the problem is not in the Handpiece Hanger. Proceed with the next step.	Follow the instructions given with the Three-Way Micro-Valve test procedure. Be sure to re-set the Cutoff Valve to the AUTOMATIC position.
	Internal blockage prevents the air signal from the Foot Control Signal Relay from reaching the diaphragm.	Disconnect the tube from the barb on the cover at the rear of the Water Coolant Valve. With the Water Coolant Valve toggle ON, step on the Foot Control and check for a stream of air coming from the barb. If there is no air flow from the barb, remove the four screws that hold the Cutoff Valve to the Water Coolant Valve. Step on the Foot Control and check for a stream of air from the passage that leads from the manual portion of the Water Coolant Valve up to the Cutoff Valve. If there is no flow, the obstruction is in the manual portion of the Water Coolant Valve. If there is air going into the Cutoff Valve, but none coming out, the obstruction is in the Cutoff Valve.	If there is a flow of air from the barb, there is no obstruction in the signal passages of the Water Coolant Valve. Proceed with the next step.	Disassemble the obstructed part of the valve. Clean and inspect all parts. Replace any defective parts, then re-assemble and test the valve.
	Leaking diaphragm.	Turn the Master On-Off Valve OFF, then remove the cover from the rear of the Water Coolant Valve and inspect the diaphragm for leaks.	If the diaphragm is okay, remove the water relay stem. Clean and inspect all parts. Replace any defective parts, then re-assemble and test the valve.	If the diaphragm is defective install a new one. Re-test the valve.
Water coolant does not completely shut off when the Foot Control is released.	The air signal from the Signal Relay Valve does not shut off (Water Coolant Valve is okay).	Turn the water coolant toggle OFF. Check for continued water coolant flow at the handpiece.	If the coolant does not shut off, proceed with the next step.	If the coolant flow stops, refer to the instructions for the Signal Relay for the test procedure.

Water Coolant Valve

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Relay stem sticks or has a defective return spring.	Turn the Master On-Off Valve OFF, then remove the cover from the rear of the Water Coolant Valve. Press and release the relay stem to check its freedom of movement.	If the stem seems to move freely, proceed with the next step.	If the stem sticks, remove it and inspect for debris or defects. Replace any defective parts, re-assemble and test the valve.
	Defective O-ring seal on the end of the relay stem.	Remove the stem and inspect the seal area for debris or defects.	If there are no apparent defects, re-assemble and test the valve.	Replace any defective parts, re-assemble and test the valve.
Water coolant operates even though the toggle is turned OFF.	Leaking diaphragm in the Air Coolant Valve (Water Coolant Valve is okay).	With a pair of hemostats, clamp off the tube that runs from the cover on the Water Coolant Valve to the spacer on the Air Coolant Valve.	If the water coolant now operates only when the toggle is turned ON, replace the diaphragm between the spacer and the cover in the Air Coolant Valve.	If the problem persists check for defective O-ring seals on the stem under the Water Coolant Valve toggle.
External leakage of water or air from the valve.	Loose fasteners.	Tighten the screws that hold the valve together. If the leak is between the shut-off valve body and the water relay body, it will be necessary to remove the Water Coolant Valve from the manifold to gain access to the screws.	If the leaking stops, no further action is required.	If tightening the screws fails to stop the leakage, proceed with the next step.
	Defective seal around the O-rings or diaphragm.	Disassemble the valve and check the condition of the diaphragm or O-rings at the joint that is leaking. Replace any defective parts.	If the leaking stops, no further action is required.	If the leaking persists, check for debris in the sealing surfaces. Replace any defective parts. Re-assemble and test the valve.

NOTES

Automatic Bowl Rinse System

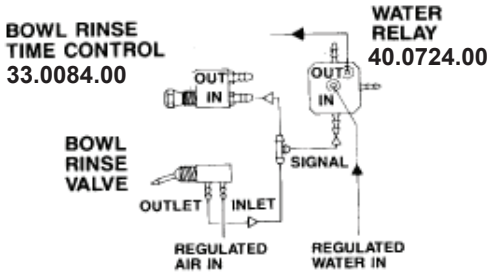


FIGURE A

Description

The bowl rinse system used on A-dec cuspidors consists of an air-actuated water relay valve, a momentary two-way valve, and a needle valve. Actuating the two-way valve provides a stream of water for rinsing the cuspidor bowl. After a pre-set period of time, the water automatically shuts off.

Operating Principle

A schematic for the automatic bowl rinse system used with a Filter-Regulator utility system is shown in Figure A. The automatic bowl rinse used with a Utility Module system (since 1982) is shown in Figure B. Actuating the two-way valve applies air pressure to the signal inlet on the water relay, opening the relay and allowing water to flow. The signal air pressure begins to bleed down as air exhausts from the time control valve. The rate at which the pressure bleeds down is determined by the setting of the time control valve. When the signal air pressure drops sufficiently, the water relay closes and the cycle ends.

Bowl Rinse Time Adjustment

The bowl rinse time is pre-set at 25-30 seconds. If adjustment is necessary, turn the bowl rinse time control valve clockwise to increase rinse time or counterclockwise to decrease rinse time.

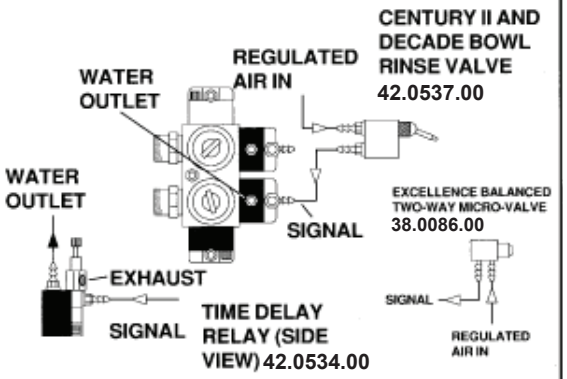


FIGURE B

TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION: IF TEST IS NORMAL	CORRECTIVE ACTION: IF TEST IS ABNORMAL
Bowl rinse does not activate when the bowl rinse toggle valve is flipped.	Inadequate air or water supply to the cuspidor.	Check the gauges in the Utility Center, and make sure air pressure is at 80 psi and water pressure is at 40 psi.	If pressures are normal, proceed with the next step.	If air or water pressure is low, refer to the instructions for Pre-Regulators and Pilot-Operated Regulators.
	Improper adjustment of the Bowl Rinse Time Control Valve.	Turn the Bowl Rinse Time Control Valve clockwise, while pressing the corresponding two-way valve.	If the bowl rinse activates, set the Rinse Time Control for the desired length of time.	If the bowl rinse does not activate when the control is turned fully clockwise, proceed with the next step.
	Defective Time Control Valve.	**Figure A systems:** Clamp a hemostat on the tube going to the Bowl Rinse Time Delay Relay, or place a finger over the exhaust air bleed hole in the Time Control Valve, then press and release the Bowl Rinse Valve. **Figure B systems:** Proceed to next step.	If the bowl rinse does not activate, the problem is not in the Rinse Time Control. Remove the hemostat or finger and proceed with the next step.	If the bowl rinse activates, check for a leaky connection at the inlet or a defective stem in the Bowl Rinse Time Control.

Automatic Bowl Rinse System

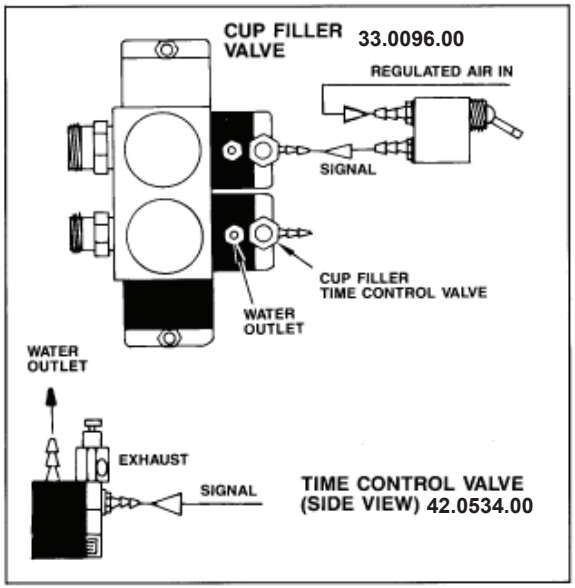
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	No air is passing through the Bowl Rinse Valve.	**Figure A systems**: Clamp a hemostat on the green tube with black dashes (signal air) going to the water relay; and turn the Bowl Rinse Time Control fully counter-clockwise. Press the Bowl Rinse Valve and check for air exhausting from the Bowl Rinse Time Control outlet.	If there is an air flow, remove the hemostat and turn the Rinse Time Control to mid-range. Proceed with the next step.	If there is no air flow, refer to the instructions for Two-Way Control Valves.
		Figure B systems: Disconnect the green tube with black dashes (signal air) from its barb on the Time Delay Relay. Activate the Bowl Rinse Valve, then check for air flowing from the tubing.	If there is air flow, reinstall the tubing on the barb. Proceed to next step.	If there is no air flow, refer to the instructions for Two-Way Control Valves. **Note**: On Excellence units, refer to the instructions on Two-Way (balanced) Micro-Valves.
	Defective water relay valve.	Disconnect the green tube with black dashes (signal air) from the Water Relay. Use a Valve Test Syringe to apply air pressure to the Water Relay signal air inlet.	If the Bowl Rinse activates, check for leaking or obstructed air tubing between the Bowl Rinse Valve and the Time Delay Relay.	If the Bowl Rinse does not activate, refer to the instructions for Water Relays.
Bowl rinse activates, but does not stay on when the Bowl Rinse Valve is released.	Improper adjustment of the Bowl Rinse Time Control.	Turn the Bowl Rinse Time Control clockwise, then press and release the Bowl Rinse Valve.	If the bowl rinse continues running when the valve is released, set the Rinse Time Control for the desired rinse time.	If the bowl rinse does not stay on after the valve is released when the Rinse Time Control is fully clockwise, proceed with the next step.
	Defective Bowl Rinse Time Control.	**Figure A systems**: Clamp a hemostat on the tube going to the Bowl Rinse Time Control, then press and release the Bowl Rinse Valve. The bowl rinse should stay on when the button is released.	If the bowl rinse stays on, check for a leaky connection on the inlet barb or a defective stem in the Rinse Time Control.	If the bowl rinse does not stay on, look for air leaks in the tubing between the Bowl Rinse Valve and the Water Relay, while pressing the button.
		Figure B systems: Turn the Time Control Valve fully clockwise, then activate the Bowl Rinse Valve.	If the bowl rinse stays on, readjust the Time Control Valve for the desired time, then re-test the unit.	If the bowl rinse does not stay on, check for air leaking from the exhaust air bleed hole. If there is air leakage, replace the Time Control Valve (refer to the section of Needle Valves). If there is no leakage at the bleed hole, check for leakage in the line between the Bowl Rinse Valve and the Time Delay Relay.

Automatic Bowl Rinse System

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Bowl rinse does not automatically shut off.	Improper adjustment of the Bowl Rinse Time Control.	Turn the Bowl Rinse Time Control counter-clockwise while the rinse is activated.	If the bowl rinse stops, set the Rinse Time Control for the desired rinse time.	If the rinse does not shut off when the Bowl Rinse Time Control is fully counter-clockwise, proceed with next the step.
	Defective Time Control Valve.	Remove the Time Control Valve (or the tubing going to the Time Control Valve for systems as in Figure A). The water should shut off immediately.	If the water shuts off, there is an obstruction in the Time Control Valve. For systems as in Figure A, refer to the instructions for needle valves. For systems as in Figure B, clean the valve inlet.	If the water stays on, refer to the instructions for the Water Relay Valve.

NOTES

Automatic Cup Fill System (Century II and Decade)



NOTE: For **Excellence** cuspidors, refer to Section T-28A.

Description

The automatic cup filler system used on A-dec Century II and Decade cuspidors consists of an air-actuated water relay valve, a momentary two-way valve, and a needle valve. With a single touch of the two-way valve, it provides a steady stream of water for filling a cup. After a pre-set period of time, the water automatically shuts off.

Operating Principle

A schematic for the automatic cup filler systems is shown in the figure. Flipping the two-way valve applies air pressure to the signal inlet on the water relay, thus opening the relay and allowing water to flow from the nozzle. When the valve is released, the signal air pressure begins to bleed down as air exhausts through the time control valve. The speed with which the pressure bleeds down is determined by the setting of the time control valve. When the signal air pressure drops sufficiently, the water relay closes and the cycle ends.

Cup Filler Time Adjustment

The cup filler is factory pre-set for a three-oz. cup. If adjustment in the field is necessary, turn the respective time control valve clockwise to increase flow time or counter-clockwise to decrease flow time.

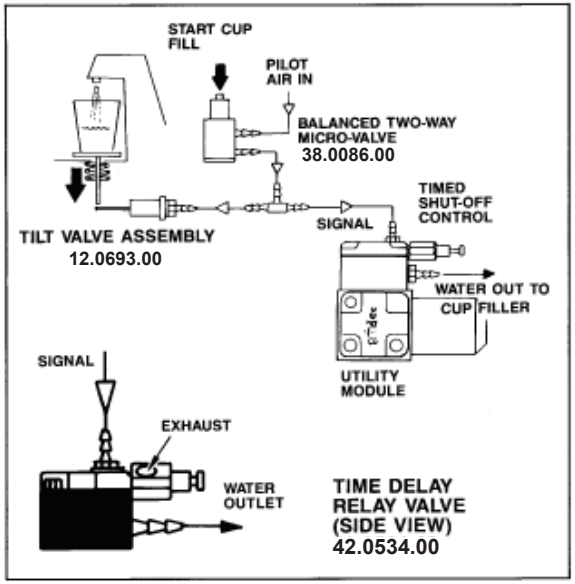
TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Cup Filler does not activate when the Cup Filler Valve is flipped.	Inadequate air or water supply to the cuspidor.	Check the guages in the Utility Center, and make sure air pressure is at 80 psi and water pressure is at 40 psi.	If pressures are normal, proceed with the next step.	If air or water pressure is low, refer to the instructions for Pre-Regulators and Pilot-Operated Regulators.
	Improper adjustment of the Cup Filler Time Control Valve.	Turn the Cup Filler Time Control Valve clockwise, while pressing the Cup Filler two-way valve.	If the water flow activates, set the Time Control Valve for the desired length of time.	If the water flow does not activate when the control is turned fully clockwise, proceed with the next step.
	No air is passing through the Cup Filler Valve.	Disconnect the signal air tube from its barb on the Time Delay Relay. Activate the Cup Filler Valve, then check for air flowing from the tubing.	If there is air flow, reinstall the tubing on the barb. Proceed with the next step.	If there is no air flow, refer to the instructions for Two-Way Control Valves.

Automatic Cup Fill System (Century II and Decade)

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Defective water relay valve.	Disconnect the green tube with black dashes (signal air) from the Water Relay. Use a Valve Test Syringe to apply air pressure to the Water Relay signal air inlet.	If the water flow activates, check for leaking or obstructed air tubing between the Cup Filler Valve and the Time Delay Relay.	If the water flow does not activate, refer to the instructions for Water Relays.
Cup Filler activates, but does not stay on when the Cup Filler (two-way) Valve is released.	Improper adjustment of the Time Control Valve.	Turn the Time Control clockwise, then press and release the Cup Filler Valve.	If the water continues running when the valve is released, set the Time Control for the desired length of time.	If the water does not stay on, look for leaks in the tubing between the Cup Filler Valve and the Water Relay, while pressing the toggle.
	Defective Cup Filler Time Control.	Turn the Time Control Valve fully clockwise, then activate the Cup Filler Valve.	If the Cup Filler stays on, readjust the Time Control Valve for the desired time, then re-test the unit.	If the Cup Filler does not stay on, check for air leaking from the exhaust air bleed hole. If there is air leakage, replace the Time Control Valve (refer to the section on Needle Valves). If there is no leakage at the bleed hole, check for leakage in the line between the Cup Filler Valve and the Time Delay Relay.
Water does not automatically shut off.	Improper adjustment of the Time Control Valve.	Turn the Time Control Valve counter-clockwise while the relay is activated.	If the water flow stops, set the Time Control for the desired length of time.	If the water does not shut off when the Time Control is fully counter-clockwise, proceed with the next step.
	Defective Time Control Valve.	Remove the Time Control Valve. The water should shut off immediately.	If the water shuts off, there is an obstruction in the Time Control Valve, clean the valve inlet.	If the water stays on, refer to the instructions for the Water Relay Valve.

Automatic Cup Fill System (Excellence)



NOTE: For **Century and Decade** cuspidors, refer to Section T-28.

Description

The automatic cup filler system used on A-dec's Excellence cuspidors consists of an air-actuated water relay valve, a momentary balanaced two-way valve, and a needle valve. As with Century II and Decade automatic cup fillers, a single touch of the two-way micro-valve provides a steady stream of water for to the cup. However, with the Excellence cup filler, water shut off is controlled by the weight of the water in the cup: when the cup reaches a pre-determined weight, the cup platform shaft pushes down on the tilt valve and causes the water to shut off. A safety bleed needle valve shuts off the water to the cup after a pre-determined time and ensures that flooding will not occur in the event that the cup filler is operated without a cup on the platform, or if the platform is improperly adjusted.

Operating Principle

A schematic for the Excellence automatic cup filler system is shown in the figure. Pressing the cup filler button opens the two-way valve, allowing pressure to be applied to the signal inlet on the water relay, thus opening the relay and allowing water to flow from the nozzle. The signal air is maintained until the water in the cup reaches a pre-determined weight. As the cup fills, it presses down on the platform, eventually causing the platform shaft to contact the tilt valve. The pressure on the tilt valve exhausts the signal air, causing the water flow to the cup to stop.

Cup Filler Time Adjustment

The cup filler is factory pre-set to fill a light-weight, three-oz. cup approximately half full. To adjust the amount of water to the cup, turn the cup platform clockwise to decrease the amount of water and counterclockwise to increase the amount. Press down on the platform to quickly stop the flow of water should the cup overfill. The safety bleed needle valve, is factory preset to bleed off the signal air after approximately 30 seconds and should not need to be readjusted.

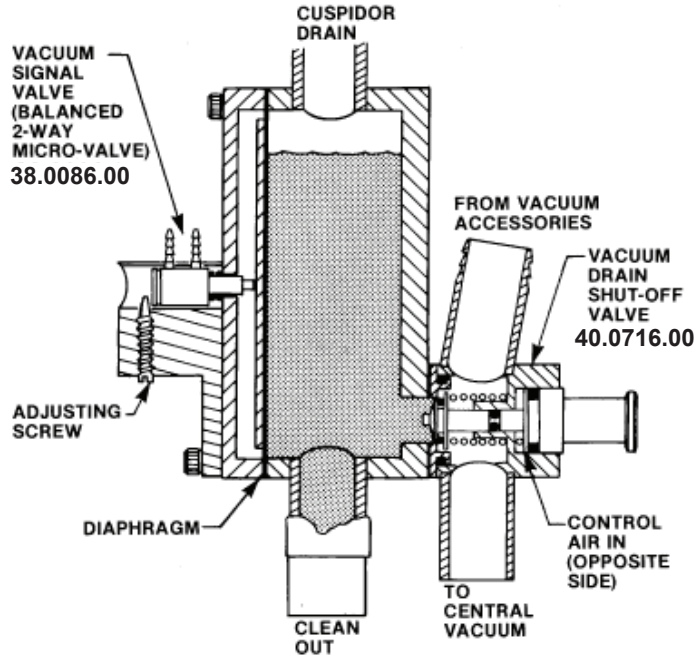
TROUBLESHOOTING GUIDE

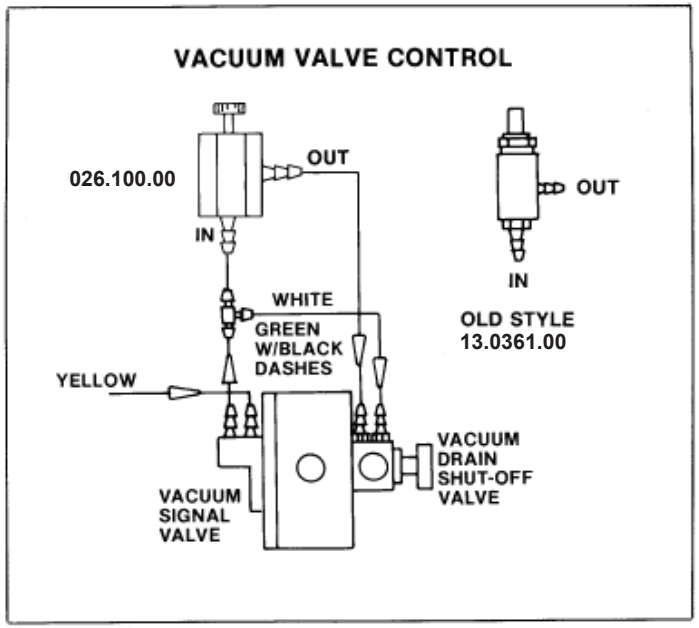
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Cup Fill does not activate.	Inadequate air or water supply.	Make sure the master toggle is on and the manual shut off valves are open. Check the gauges in the post-mounted utility center. Air pressure should be at 80 psi and water pressure at 40 psi.	If pressures are normal, proceed to the next step.	If air or water pressure is low, refer to instructions for pre-regulators and pilot-operated regulators.
	Improper adjustment of cup-fill platform.	Rotate the platform counterclockwise until it stops. Press the actuator button.	If the cup fill activates, adjust the platform for proper fill level.	If the cup fill does not activate, rotate the platform to mid-range and proceed to next step.
	Defective 2-way micro-valve.	Disconnect the signal air tube from its barb on the plastic tee. Press the actuator button and check for air flow from the tube.	If there is signal air when the button is pressed, reinstall the tube onto the tee and proceed to next step.	If there is no air refer to instruction for 2-way control valves.

Automatic Cup Fill System (Excellence)

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Defective Time Delay Relay Valve.	Disconnect the signal air tube from the Time Delay Relay. Press the actuator button and check for flow of air from the tube.	If there is signal air at this point, refer to the instruction for Water Relay.	If there is no air flow, check for a plugged barb, tee, or crimped tube.
Cup Filler shuts off when the button is released.	Improper adjustment of Cup Fill Platform.	Rotate the platform counterclockwise until it stops. Press the actuator button.	If water now flows, adjust the platform for the proper fill level.	If water does not continue to flow, rotate the platform to mid-range and proceed to next step.
	Shaft of platform is deflecting the stem of the Tilt Valve.	Use a flashlight to look up under the cuspidor housing and locate the stem of the Tilt Valve. The shaft of the platform should not be in contact with the Tilt Valve stem when no pressure is being applied to the platform.	If the shaft is not touching the stem, proceed to the next step.	If the shaft is touching the Tilt Valve, remove the cup holder and adjust the setscrew above the Tilt Valve bracket in a clockwise direction. Replace the cup holder and adjust the platform for proper fill level.
	Improper adjustment of Time Control Valve.	Adjust the Time Control Valve clockwise until it stops. Press the actuator button.	If the Cup Fill operates normally, clamp the tube between the tee and the Tilt Valve with a hemostat, then adjust the time control valve to approximately thirty seconds.	If cup fill does not operate normally, check for leakage in the signal air line.
Water sputters from cup fill nozzle.	Air in Water System.	Check for water sputtering at the bowl rinse or syringe.	If water in location other than cup fill does not sputter, replace the diaphragm in the cup fill time delay relay.	If water does sputter at bowl or syringe, check for faulty diaphragms at the pilot-operated water shut-off valve and the pilot-operated water regulator valves.

Vacuum Drain Actuator Assembly





Description

The vacuum drain actuator assembly for A-dec cuspidors consists of an air-operated vacuum drain valve and a vacuum signal valve. The vacuum signal valve is a balanced Two-Way Micro-Valve (38-0086-00) that is actuated by the weight of water in the drain tubing and chamber.

Operating Principle

The schematic diagram shows the complete vacuum drain system (also see Page No. B-9). Water drains by gravity from the cuspidor bowl into the drain chamber. The weight of the water in the drain chamber and sight tube deflects the diaphragm and opens the vacuum signal valve. This sends an air signal to the vacuum drain shut-off valve, pressurizing the air behind the piston assembly, pushing it outward and opening the drain. Since the outlet side of the vacuum drain shut-off valve is connected to the central vacuum, the water is drawn past the drain seal.

The vacuum valve control bleeds the air pressure from behind the piston, so that when the weight of the water in the drain chamber has decreased sufficiently to close the vacuum signal valve, the vacuum drain shut-off valve gradually closes. The vacuum valve control can be adjusted to regulate the sensitivity of the vacuum drain actuator.

Vacuum Drain Adjustment Procedure

There are two adjustments that control the operation of the vacuum drain shut-off valve; (1) the vacuum signal valve and (2) the vacuum valve control (refer to Page nos. B-14, B-15, B-17, and B-19). These should be adjusted only when the need is indicated by following the troubleshooting procedure given below. If adjustment is required, proceed as follows:

1. Turn the vacuum valve control fully clockwise, then turn it counterclockwise two full turns. **Note:** If the vacuum valve is the old style (refer to drawing), used prior to February 1982, turn it fully clockwise, then counterclockwise one full turn.
2. If the drain is operating continously, use a 3/32-inch hex wrench to turn the vacuum signal valve adjusting screw counterclockwise until the drain closes. If you run out of adjustment and the drain remains open, check for a missing spring in the vacuum signal valve mount or for a defective inlet seal in the vacuum signal valve.
3. If the drain is closed, so water backs up into the cuspidor bowl, turn the vacuum signal valve adjusting screw clockwise until the drain opens. If the adjusting screw bottoms out before the drain opens, refer to "Cuspidor does not drain", in the Troubleshooting Guide on the next page.
4. Alternately run water in the bowl and adjust the vacuum signal valve until the drain opens when the water level is about one inch above the bottom of the sight tube.
5. Use the vacuum valve control for fine adjustment of the vacuum drain, so that the drain opens when the water level is just below half-way up the sight tube.

Vacuum Drain Actuator Assembly

TROUBLESHOOTING GUIDE				
SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Vacuum drain does not shut off, so the drain gurgles continuously.	Debris in the Vacuum Drain Shut-Off Valve prevents it from closing.	Remove the clean-out plug and thoroughly flush out the bowl and drain chamber. Pull and release the manual drain knob several times to dislodge debris from the Vacuum Drain Shut-Off Valve.	If the drain closes and works properly, no further action is required.	If the drain remains open, proceed with the next step.
	Defective seal between the drain chamber and the Shut-Off Valve.	Press on the manual drain knob, and listen to the drain.	If the vacuum noise stops while pressing the knob, and resumes when the knob is released, proceed with the next step.	If the vacuum noise persists while pressing the knob, remove the Vacuum Drain Shut-Off Valve and inspect the drain seal area. Clean all parts and, if necessary, replace the O-ring. Re-assemble and test the unit.
	Improperly adjusted or defective Vacuum Signal Valve.	Clamp a hemostat on the tube at the outlet of the Vacuum Signal Valve. Listen to the drain.	If the vacuum noise persists, proceed with the next step.	If the vacuum noise stops, remove the hemostat and adjust the vacuum drain according to the instructions given above.
	Improperly adjusted Vacuum Valve Control.	With the hemostat still in place from the preceeding step, turn the Vacuum Valve Control counter-clockwise. Listen to the drain.	If the vacuum noise persists, proceed with the next step.	If the vacuum noise stops, remove the hemostat and adjust the vacuum drain according to the instructions given above.
	Defective Vacuum Valve Control or Vacuum Drain Shut-Off Valve.	Disconnect the green tube with black dashes (signal air) from the Vacuum Drain Shut-Off Valve. Listen to the drain.	If the vacuum noise persists, remove and disassemble the Vacuum Drain Shut-Off Valve. Clean and inspect all parts and replace any that are defective. Re-assemble and test the unit.	If the vacuum noise stops, check for any obstructions in the barbs and tubing going to and from the Vacuum Valve Control, and in the Vacuum Valve Control itself.

Vacuum Drain Actuator Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Cuspidor does not drain.	Air supply or central vacuum is shut off.	Check the gauges in the utility center and at the vacuum pump and make sure all supply valves leading to the cuspidor are open.	If air pressure and vacuum are present, proceed with the next step.	If either air pressure or vacuum is lacking, trace the problem upstream to its source. For air pressure problems refer to the instructions for the Pre-Regulators and Pilot-Operated Regulators.
	Cuspidor drain clogged by debris.	Pull the manual drain knob. The cuspidor bowl should drain quickly and completely.	If the bowl drains properly, proceed with the next step.	If the bowl does not drain, or drains too slowly, check for debris in the amalgam trap, drain tube, and drain chamber. Remove the clean-out plug and flush out the drain.
	Improper adjustment of the Vacuum Valve Control.	Run the bowl rinse until water backs up in the bowl, then turn the Vacuum Valve Control clockwise and see if the drain opens.	If the bowl drains, conduct the vacuum drain adjustment procedure given above.	If the bowl does not drain when the Vacuum Valve Control is turned fully clockwise, proceed with the next step.
	Defective Vacuum Valve Control.	Clamp a hemostat on the green tube with black dashes (signal air) going into the Vacuum Valve Control, and see if the drain opens.	If the bowl drains, check for a loose connection on the inlet barb or a defective stem in the Vacuum Valve Control.	If the bowl does not drain, remove the hemostats and proceed with the next step.
	Improper adjustment of the Vacuum Signal Valve.	With water in the cuspidor bowl, turn the Vacuum Signal Valve adjusting screw clockwise and see if the drain opens.	If the bowl drains, conduct the vacuum drain adjustment procedure given above.	If the bowl does not drain when the adjusting screw is screwed all the way in, proceed with the next step.

Vacuum Drain Actuator Assembly

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
	Defective diaphragm in the drain chamber.	Remove the Vacuum Signal Valve from its mount, then depress the valve stem manually.	If the drain opens, remove the cover from the drain chamber, and thoroughly clean it out. Re-assemble it with a new diaphragm, re-install the Vacuum Signal Valve, and test the unit.	If nothing happens, proceed with the next step.
	No air flow from the Vacuum Signal Valve.	Disconnect the tube from the outlet of the Vacuum Signal Valve. Manually depress the valve stem and check for air flow through the valve.	If air flows from the valve, re-connect the tube and proceed with the next step.	If there is no air flow through the valve, refer to the instructions for Two-Way Micro-Valves.
	Obstructed tubing or "Tee" barb.	Disconnect the green tube with black dashes (signal air) from the Vacuum Drain Shut-Off Valve. Manually depress the Vacuum Signal Valve stem, and check for air flow from the loose tube.	If air flows from the tube, proceed with the next step.	If there is no air flow, look for a crimped or plugged tube, or a plugged "Tee" barb between the Vacuum Signal Valve and the Vacuum Drain Shut-Off Valve.
	Defective Vacuum Drain Shut-Off Valve.	Remove and disassemble the Vacuum Drain Shut-Off Valve. Carefully inspect the O-rings and internal sufaces for defects or debris.	If no defects are noted, clean and lubricate all parts. Re-assemble and test the unit.	Replace any defective parts. Re-assemble and test the valve.
NOTES				

Clean Water System

Description

The clean water system is used to control the quality and pressure of the water supplied to the handpieces and syringe. The system is installed in the oral cavity water line to create a self contained water system (refer to pages D-5 through D-10). The three main components of the system are a water pre-regulator (24-0182-00), cap with restrictor barb and the water bottle.

Operating Principle

The water bottle is filled and installed in the system. Moving the master toggle to the on position pressurizes the bottle to 40 psi.

Pressure Adjustment

Factory installed systems are pre-set at 40 psi. If adjustment is necessary, refer to pre-regulator adjustment instructions in section T-2.

Cautions

Never maintain regulated air pressure to the water bottle above 40 psi.

Never install a damaged (wrinkled, creased or milky appearance) water bottle.

TROUBLE SHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
No Water	Lack of Air pressure to the water bottle.	Make sure the Master toggle is in the ON position.	If the toggle is in the ON position, proceed with next step.	Move the toggle to the ON position and retest the unit.
	No air through the restrictor barb.	Move the Master toggle to the OFF position and bleed the system of air pressure. Remove the restrictor barb from the cap. Move the Master toggle to the ON position and check for air flow through the barb.	Proceed with the next step.	Replace the restrictor barb and retest the unit.
	Loose barbs on the cap	Check the barbs on the cap for loose connections.	Proceed with the next step.	Tighten the barb and retest the unit.
	Damaged bottle gasket.	Remove the bottle from the cap and inspect the gasket.	Reinstall the gasket and bottle. Proceed with the next step.	Replace the gasket and retest the unit.
	Water is not flowing to the control block	Remove the oral cavity tubing from the control block. Test the Clean Water System. Water should flow from the tubing.	Refer to the instructions for the control manifold.	Check the outlet barb and tubing for obstructions.

Handpiece Flush System

Description

The handpiece flush system is used to direct system water to the handpieces and rapidly wash away contaminants that accumulate in the handpiece and tubing. The flush toggle valve is teed to the oral cavity water line. The outlet line of the flush toggle valve is connected to tee check valves which are installed between the control blocks and the handpieces. Refer to pages B-21, B-22, and D-5 through D-10.

Operating Principle

The handpiece flush system is activated when the Master toggle is in the on position and the Flush Toggle is held in the ON position.

TROUBLE SHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	CORRECTIVE ACTION	
			IF TEST IS NORMAL	IF TEST IS ABNORMAL
Water leaks from all Handpieces.	The Handpiece Flush toggle valve is stuck open.	Remove the handpieces from their holders and hold them over a sink or basin. Activate the Handpiece Flush toggle several times. The water flow should stop when the toggle is released.	Return the handpieces to their proper holder.	If leakage continues, replace the flush toggle valve.
No water from any handpiece.	No water to the Handpiece Flush valve.	Move the Master toggle to the OFF position and bleed the system of air and water pressure. Remove the oral cavity water line from the flush toggle. Direct the tubing into a sink or basin. Move the Master toggle to the ON position. Water should flow from the tubing.	Reinstall the tubing and proceed with the next step.	Refer to the instructions for the Clean Water System or Filters
	Handpiece Flush valve is defective.	Remove the Flush Valve outlet tubing from the four way cross. Direct the tubing into a sink or basin. Move the Flush Valve toggle to the ON position. Water should flow from the tubing.	Reinstall the tubing. Refer to the instructions for the control manifold.	Repair or replace the Flush Valve.
No water from one handpiece.	Plugged four way cross.	Remove the tubings which connect to the tee check valves. Direct the cross into a sink or basin. Depress the foot control disc. Water should flow from the cross.	Reinstall the tubing. Proceed with the next step.	Remove debris from, or replace the cross. Test the unit.
	Defective tee check valve.	Identify the tee check valve that is connected to the handpiece. Remove the handpiece tubing from the tee check valve and hold the check valve over a sink or basin. Depress the foot control disc. Water should flow from the check valve.	Check the handpiece and handpiece tubing for obstructions.	Replace the tee check valve and test the unit.